S8428-1-U

Data Summary and Problem Analysis

1988 Traffic Collisions in Washington State

June 1989

Washington Traffic Safety Commission
1000 South Cherry Street
MS PD11
Olympia, WA 98504

Highway Safety Plan
Data Summary and Problem Analysis

Statewide Summary .... Page

Explanation of Problem Analysis Process 1

Data Analyses and Statistical Techniques 1

Statewide Overview 3

Alcohol Involvement 15

Youth Involvement 26

Safety Restraint Use 32

Motorcycle Collisions 39

Pedalcycles 45

Pedestrians 49

Heavy Trucks 53

Pupil Transportation 58

Contributory Driver Violations 59

Vehicle Defects 60

Senior Driver Involvement 61

Statewide Summary

I. Explanation of Problem Analysis Process

In developing the problem identification section for the 1990 Highway Safety Plan (HSP), problem areas were classified into two basic types: impact problems and system support problems.

Impact problems consist of factors that contribute directly to the occurrence of collisions, fatalities, and/or injuries and may be corrected through the implementation of countermeasures designed to reduce the effects of these factors.

System support problems are those deficiencies within vital traffic safety programs that when corrected may not directly reflect a reduction of traffic collisions, injuries, or fatalities.

There are two bases for impact and system support problem identification, analysis, and selection for inclusion into the HSP.

1. Impact problem areas were selected based on appropriate statewide experience of impact areas (where information was available) as outlined in the federal safety standards. Various statewide automated and manual traffic information systems were inventoried and analyzed. The data sources included: Traffic Accident Records, Fatal Accident Reporting System, Driver's Licensing Records, Vehicle Registration Records, and Highway/Roadway Information. In most instances, data from four years were gathered as a baseline to serve as a point of comparison to the current year's activity level.
2. The second source for problem identification inclusion in the HSP consisted of data analyzed by and for various state and local agencies with an interest in highway safety. The WTSC made it known that the two main emphasis areas in FY 1990 were the non-use of occupant-restraint systems, and alcohol-related collisions.

II. Data Analyses and Statistical Techniques

Data analysis was a key factor in the identification and selection of the traffic safety problem areas included in this plan. The analyses were performed to ensure that the conclusions drawn from the data were valid and credible.

The most common data sources in the HSP were the statewide traffic collision records, which were used for identifying the specific traffic problem areas. Four continuous years (1984-1987) of collision experience were used to serve as a baseline in analyzing the traffic collision data. This baseline was used to obtain a better perspective to assess the current year's (1988) experience with traffic problem areas. The baseline also serves to negate short-term changes in collision patterns.

The development of over/under-representation ratios were the most frequently used methods of analysis. Where relevant exposure data were available, the generation of over-representation ratios allow for the comparisons of different subgroups relative to the percentage of the population they comprise. Additionally, counties and cities were ranked by different problem areas to compare geographical and political subdivisions.

Analysis of Selected Traffic Problems

The following areas were included for analyses of selected traffic safety problems:

- Alcohol Involvement
- Youth Involvement
- Safety-Restraint Usage
- Motorcycle Collisions
- Pedalcycles
- Pedestrians
- Heavy Trucks
- Pupil Transportation
- Contributory Driver Violations
- Vehicle Defects
- Senior Driver Involvement

Statewide Overview

The number of persons killed on Washington's highways in 1988 totaled 785, a 4.2% increase from the 1985-1987 three-year baseline average of 753. The total number of fatal collisions increased 5.2% in 1988 compared to the average for 1985-1987. Total collisions, injury collisions, and total number of persons injured also increased in 1988 over the three-year averages in these categories (Table 1-1).

Table 1-1

SEVERITY OF COLLISIONS
Four-Year Comparison

Impact	Years				Previous 3 Year Average (85-87)	% of Change 88 - 3 Year Average
	1988	1987	1986	1985		
Total Collisions	125,920	126,807	122,918	120,056	123,260	2.2%
Fatal Collisions	706	699	658	656	671	5.2%
Total Killed	785	790	714	756	753	4.2%
Injury Collisions	49,482	46,968	46,090	44,373	45,810	8.0%
Total Injured	72,449	67,665	66,707	63,806	66,059	9.7%
Property Damage Only Collisions*	75,732	79,140	76,170	75,027	76,779	-1.4%

* Oct. 1, 1987 the reporting level for motor vehicle traffic collisions increased from $300 to $500. Fatal and injury collisions were not affected by this change in the law, but property damage only collisions were reduced by 4.3% in 1988.

A. Exposure

Vehicle drivers traveled 14.9% more motor vehicle miles in 1988 than the 1985-1987 baseline average. Motor vehicle registration also jumped 6.0% over the baseline while the number of licensed drivers increased 6.8%. In 1988, the state's population increased 3.1% over the 1985-87 average to a total of 4,565,000 persons (Table 1-2).

Table 1-2

VEHICLES AND DRIVERS
Four-Year Comparison

Exposure	Years				Previous 3 Year Average (85-87)	% of Change 88 - 3 Year Average
	1988	1987	1986	1985		
Motor Vehicle Travel*	41,698	38,520	36,416	33,980	36,305	14.9%
Motor Vehicle Registration	3,896,828	3,833,058	3,651,102	3,546,152	3,676,771	6.0%
Licensed Drivers	3,264,065	3,156,600	3,029,375	2,980,717	3,055,564	6.8%
State's Population	4,565,000	4,481,100	4,419,700	4,384,100	4,428,300	3.1%

*In Millions

B. Rates

The 1988 motor vehicle traffic death rate was the lowest in the state's history: down 9.6% from the previous three-year average and down 4.1% from the 1986 rate of 1.96, the previous record low. The rate of 1.74 injuries per one million vehicle miles in 1988 was down slightly from the 1.76 rate for 1987 (Table 1-3).

Table 1-3

DEATH AND INJURY RATES
Four-Year Comparison

Rates	Years				Previous 3 Year Average (85-87)	% of Change 88 - 3 Year Average
	1988	1987	1986	1985		
Death Rate (Deaths per 100M vehicle miles)	1.88	2.05	1.96	2.22	2.08	-9.4%
Injury Rate (Injuries per 1M vehicle miles)	1.74	1.76	1.83	1.88	1.82	-4.6%

C. Fatalities by Status

Drivers continued to be the most common status of those killed in 1988 as a result of motor vehicle collisions. Fatalities in this classification increased from 386 in 1987 to 394 in 1988. The 1988 figure increased 7.4% from the average of the three previous years. The 206 passengers reported killed in 1988 increased by 2 or 1.0% over 1987 and 9 or 4.7% over the three-year baseline period. The number of motorcycle drivers fatally injured in collisions decreased from 86 in 1987 to 66 last year. Last year's deaths were down 11 from the three-year baseline (Table 1-4).

Table 1-4

PERSONS KILLED BY STATUS
Four-Year Comparison

Status	Years				Previous 3 Year Average (85-87)	% of Change 88 - 3 Year Average
	1988	1987	1986	1985		
Drivers (no motorcyclists)	394	386	353	362	367	7.4%
Passengers	206	204	175	211	197	4.7%
Pedestrians	97	93	94	89	92	5.4%
Pedalcyclists	12	18	12	12	14	-14.3%
Motorcycle Drivers	66	86	71	75	77	-14.7%
Motorcycle Passengers	10	3	9	7	6	57.9%
TOTAL	785	790	714	756	753	4.2%

D. Traffic Collisions, Deaths, Injuries, Travel, and Death Rate

The 785 traffic fatalities recorded in 1988 reversed last year's increase and reverts to an earlier downward trend experienced in 1985 and 1986. Figure 1-1 indicates that traffic deaths have leveled off during the past four years in the 700 range, reaching a low of 714 in 1986 and a high of 790 in 1987. This differs from the two extremes in recent history of traffic deaths with a high of 1,034 deaths recorded in 1979 and the record low in 1983 with 705 traffic fatalities. Motor vehicle travel in 1988 increased by 8.3% over 1987 to reach an all-time high of 41.698 billion miles (Figure 1-2).

Figure 1-1

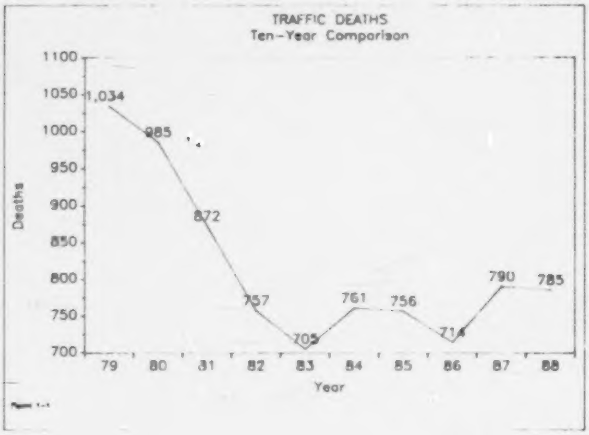
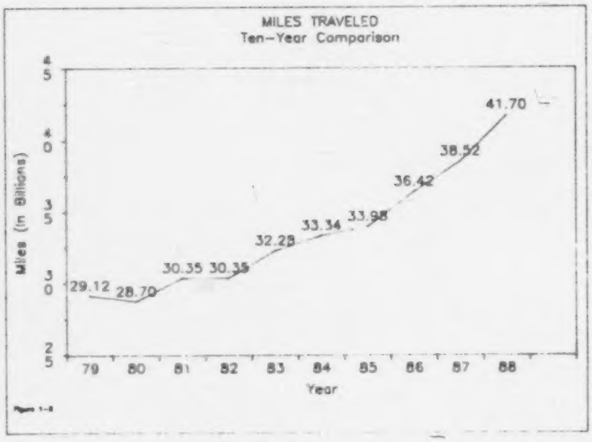


Figure 1-2



The state's 1988 traffic fatality rate of 1.88 deaths per 100 million vehicle miles of travel continues to be well below the national rate of 2.50 for the year. The 1.88 rate is the lowest point in Washington's history and fell from the 2.05 rate recorded in 1987. Total reported motor vehicle traffic collisions and injuries increased over the three-year average. Compared to 1987, total collisions were down slightly while the number of persons injured was up by 7.1% (Figure 1-4).

Figure 1-3

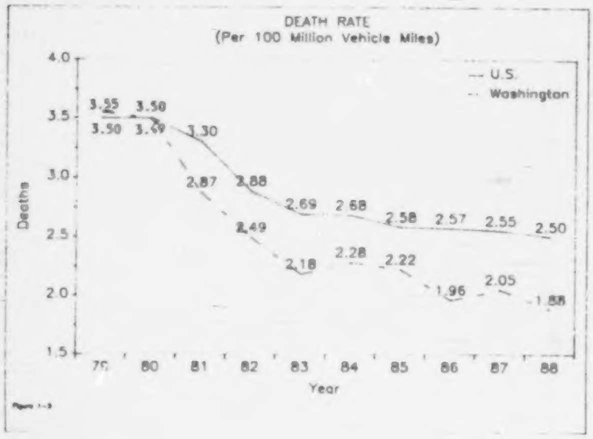
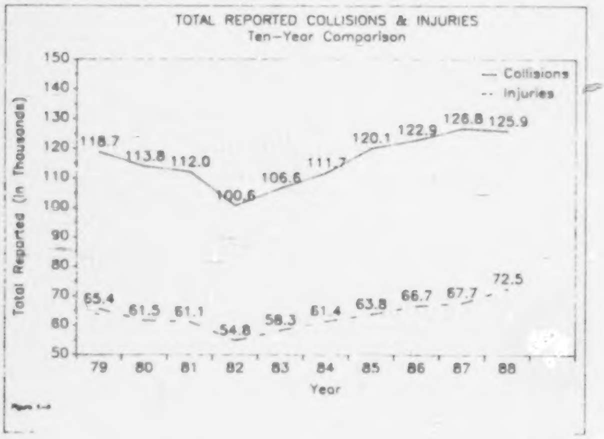


Figure 1-4



E. Highways, Travel, and Fatalities

The U.S. and state numbered system (other than the interstate system) was the most-traveled road system in the state with an estimated record of 12.084 billion miles. The interstate system continued to have the lowest death rate per 100 million vehicle miles of all the state systems at 0.98 rate recorded in 1988: an increase of 0.30 from 1987. Estimated travel on city streets increased to 10.619 billion miles in 1988 and resulted in a death rate of 1.17, which is down slightly from 1.20 in 1987. County roads were traveled an estimated 8.869 billion miles and recorded a death rate of 2.85 in 1988; a decrease from the previous year's 3.36 rate. Total motor vehicle travel in the state increased from 38.520 billion miles to 41.698 billion in 1988 (Table 1-5).

Table 1-5

HIGHWAYS, TRAVEL, AND COLLISIONS
By Type of Highway

Type of Highways	Highways		Vehicle Miles Traveled+		Collisions		
	Miles	% of Total	Miles (Millions)	% of Total	Total Collisions	Total Fatalities	Death Rate for CMVM*
Interstate System**	762	0.93%	10,028	24.05%	12,814	98	0.98
All Other State Highways	6,220	7.63%	12,084	28.98%	28,817	294	2.43
County Roads	41,748	51.20%	8,869	21.27%	27,777	253	2.85
City Streets	11,382	13.96%	10,619	25.47%	55,573	124	1.17
All Other Traffic Ways***	21,433	26.28%	98	0.24%	939	16	16.33
TOTAL	81,545	100.00%	41,698	100.00%	125,920	785	1.88

+Preliminary Estimates
*Fatalities per hundred million vehicle miles, based on roadway travel as reported by the Dept. of Transportation.
**Does not include traveled way.
***Does not include (all terrain vehicle) trails.

Table 1-6

PERSONS KILLED AND INJURED
By Age By Status

Age	Total		Occupants		Pedestrians		Pedalcyclists	
	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
0 - 4	20	1,292	10	1,172	10	97	0	0
5 - 9	17	1,990	8	1,545	4	234	5	4
10 - 14	14	2,291	9	1,706	3	197	2	1
15 - 19	113	12,175	103	11,732	10	190	0	0
20 - 24	117	11,477	114	12,169	3	149	0	0
25 - 34	192	17,031	175	16,577	15	295	2	2
35 - 44	120	11,124	106	10,831	12	210	2	2
45 - 54	45	5,257	38	5,122	7	95	0	0
55 - 64	48	3,554	41	3,436	7	96	0	0
65 - 74	40	2,432	31	2,348	8	74	1	1
75/Older	50	1,445	35	1,349	15	91	0	0
Not Stated	9	2,381	6	2,230	3	92	0	0
TOTAL*	785	72,449	676	70,217	97	1,820	12	10

*Total Injured includes 402 injured where the status of the injured was unknown.

Table 1-7

COMPARISON OF TRAFFIC DEATHS BY MONTH
Three-Year Comparison

Month	1988		1987		1986		% Change 87 to 88	
	Month Total	Year To Date	Month Total	Year To Date	Month Total	Year To Date	Month Total	Year To Date
January	40	40	54	54	42	42	-25.9%	-25.9%
February	42	82	52	106	28	70	-19.2%	-22.6%
March	70	152	62	168	56	126	12.9%	-9.5%
April	55	207	55	223	60	186	0.0%	-7.2%
May	69	276	50	273	73	259	38.0%	1.1%
June	82	358	77	350	73	332	6.5%	2.3%
July	86	444	73	423	70	402	17.8%	5.0%
August	79	523	84	507	69	471	-6.0%	3.2%
September	70	593	90	597	51	522	-22.2%	-0.7%
October	66	659	69	666	67	589	-4.3%	-1.1%
November	66	725	73	739	64	653	-9.6%	-1.9%
December	60	785	51	790	61	714	17.6%	-0.6%

Table 1-8

COLLISIONS
By Time

Time Hour Reporting	Total			Monday - Thursday			Friday - Sunday		
	All	Injury	Fatal	All	Injury	Fatal	All	Injury	Fatal
Midnight	3,039	1,236	45	1,079	425	21	1,960	811	24
1:00	2,995	1,270	43	968	393	14	2,027	877	29
2:00	2,842	1,254	50	892	367	18	1,950	887	32
3:00	1,415	559	24	430	158	8	985	401	16
4:00	1,011	392	13	385	131	1	626	261	12
5:00	1,262	468	10	625	229	3	637	239	7
6:00	2,769	1,065	13	1,816	699	6	953	366	7
7:00	5,460	2,103	15	3,942	1,536	9	1,518	567	6
8:00	4,689	1,698	13	3,075	1,141	8	1,614	557	5
9:00	4,177	1,503	19	2,515	912	10	1,662	591	9
10:00	4,846	1,725	13	2,854	999	7	1,992	726	6
11:00	6,300	2,293	21	3,673	1,309	11	2,627	984	10
Noon	7,264	2,786	22	4,024	1,494	13	3,240	1,292	9
1:00	7,247	2,767	23	4,094	1,550	16	3,153	1,217	7
2:00	8,486	3,242	27	4,885	1,863	10	3,601	1,379	17
3:00	10,078	3,941	43	5,962	2,292	24	4,116	1,649	19
4:00	10,932	4,400	36	6,615	2,659	20	4,317	1,741	16
5:00	10,803	4,445	45	6,568	2,681	17	4,235	1,764	28
6:00	7,578	3,113	45	4,265	1,727	23	3,313	1,386	22
7:00	5,895	2,422	38	3,090	1,245	16	2,805	1,177	22
8:00	4,577	1,842	33	2,338	938	17	2,239	904	16
9:00	4,428	1,781	39	2,198	883	22	2,230	898	17
10:00	3,976	1,603	30	1,848	748	14	2,128	855	16
11:00	3,851	1,574	46	1,560	655	15	2,291	919	31
TOTAL	125,920	49,482	706	69,701	27,034	323	56,219	22,448	383

Table 1-9

COMPARISON OF DRIVERS INVOLVED TO NUMBER LICENSED
Driver Age Distribution

Driver Age	Involved in Collisions		Licensed Drivers	% of Licensed Drivers	Over/Under Ratio
	Number	% of Total			
Under 16	585	0.30%	0	0.00%	---
16	4,725	2.41%	26,719	0.82%	2.94
17-18	16,164	8.23%	102,486	3.14%	2.62
19-20	14,927	7.60%	117,835	3.61%	2.11
21-22	12,779	6.51%	117,533	3.60%	1.81
23-24	12,100	6.16%	132,954	4.07%	1.51
25-29	28,546	14.54%	387,057	11.86%	1.23
30-34	24,743	12.60%	418,138	12.81%	0.98
35-39	20,747	10.57%	398,802	12.22%	0.86
40-44	15,917	8.11%	344,830	10.56%	0.77
45-49	10,634	5.42%	256,806	7.87%	0.69
50-54	7,912	4.03%	197,826	6.06%	0.66
55-59	6,805	3.47%	176,368	5.40%	0.64
60-64	5,982	3.05%	172,487	5.28%	0.58
65-69	5,097	2.60%	159,989	4.90%	0.53
70 & Over	8,700	4.43%	254,235	7.79%	0.57

F. Traffic Deaths and Vehicle Registration Death Rates by County

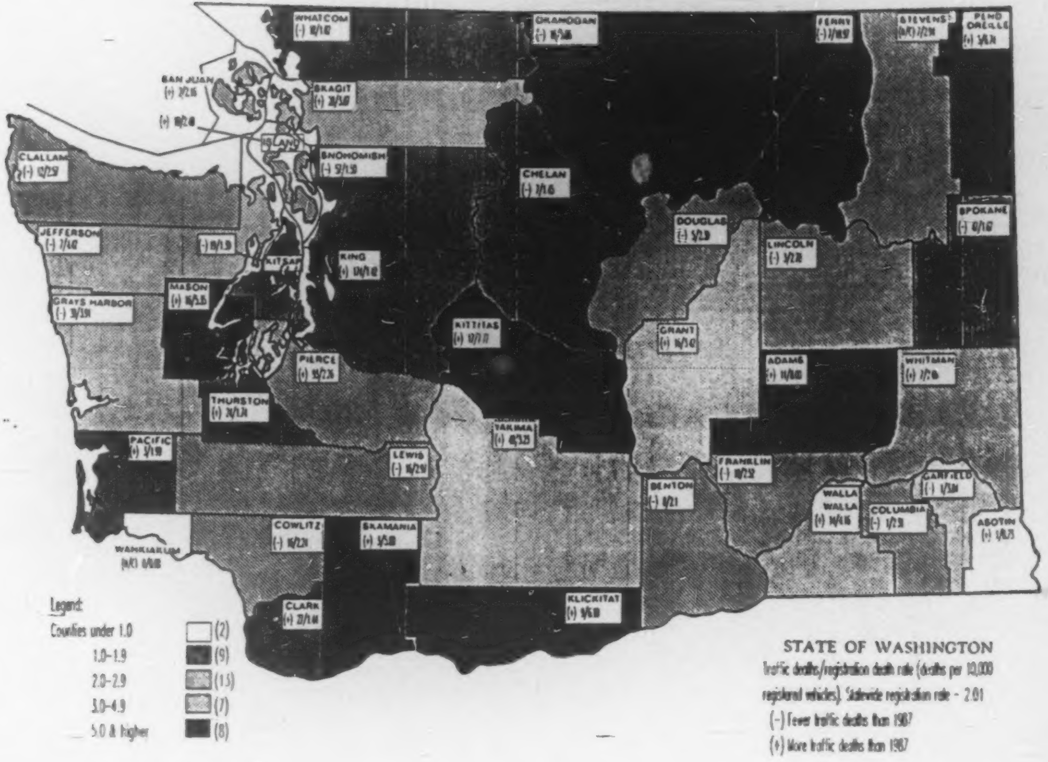
In 1988, fatalities ranged from a high of 174 in King County, with a death rate of 1.42 (traffic deaths per 10,000 registered vehicles), to a low of zero deaths in Wahkiakum county. Ferry county recorded the highest death rate at 18.97 computed from 7 fatalities, followed by Adams county that recorded a 8.00 death rate based on 11 traffic deaths, and Kittitas county that experienced 17 traffic deaths for a registration death rate of 7.77 (Figure 1-5).

E. Comparison of Drivers Involved to Number of Licensed Drivers.

Drivers 20 years old and under comprised 7.6% of all licensed drivers in the state last year, yet this age group was involved in 18.2% of the total 1988 collisions. This was a collision over-representation rate 2.41 times higher than the percentage of licensed drivers comprising this group. The 21-24 age group was involved in 12.7% of the total collisions while comprising 7.7% of all licensed drivers, producing an over-representation factor of 1.65. The 25-29 age group, comprising 14.5% of all licensed drivers, was involved in 11.9% of all collisions for an over-representation ratio of 1.23. All other age groups were under-represented when their percentages of collision involvement were compared to their percentages of total licensed drivers (Table 1-9).

Figure 1-5

Traffic Deaths and Vehicle Registration Death Rate
by County


WHATCOM
OKANOGAN
FERRY
STEVENS
PEND OREILLE
SAN JUAN
SKAGIT
ISLAND
CLALLAM
SNOHOMISH
CHELAN
JEFFERSON
KITSAP
KING
DOUGLAS
LINCOLN
SPOKANE
MASON
GRAYS HARBOR
KITTITAS
GRANT
ADAMS
WHITMAN
PIERCE
THURSTON
YAKIMA
PACIFIC
LEWIS
FRANKLIN
BENTON
WALLA WALLA
COLUMBIA
GARFIELD
ASOTIN
WAHKIAKUM
COWLITZ
SKAMANIA
CLARK
KLICKITAT
Legend:
Counties under 1.0 □ (2)
1.0-1.9 ■ (9)
2.0-2.9 ▨ (15)
3.0-4.9 ▨ (7)
5.0 & higher ■ (8)

STATE OF WASHINGTON
Traffic deaths/registration death rate (deaths per 10,000 registered vehicles). Statewide registration rate - 2.01
(-) Fewer traffic deaths than 1987
(+) More traffic deaths than 1987

Figure 1-6

Traffic Fatalities

In 1988 and Percent of Change from 1987

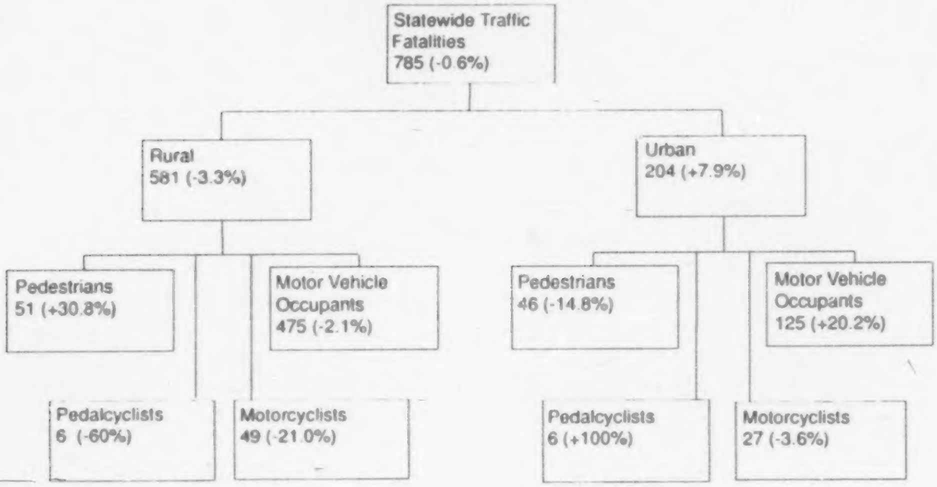

Statewide Traffic Fatalities 785 (-0.6%)
Rural 581 (-3.3%)
Urban 204 (+7.9%)
Pedestrians 51 (+30.8%)
Motor Vehicle Occupants 475 (-2.1%)
Pedalcyclists 6 (-60%)
Motorcyclists 49 (-21.0%)
Pedestrians 46 (-14.8%)
Motor Vehicle Occupants 125 (+20.2%)
Pedalcyclists 6 (+100%)
Motorcyclists 27 (-3.6%)

Figure 1-7

Traffic Fatalities by Age and Sex

1988

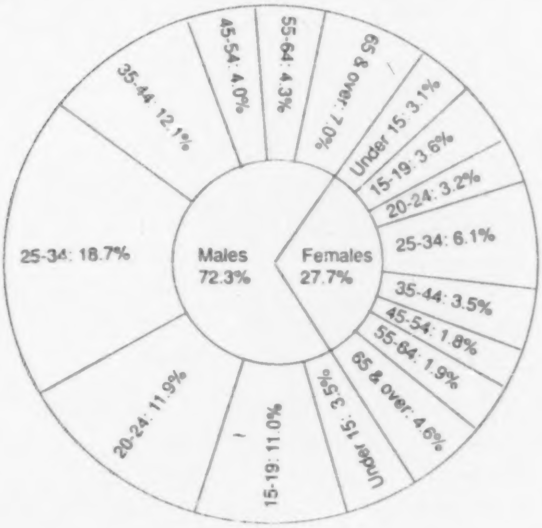


Table 1-10

COLLISION RATES BY COUNTY POPULATION
1988

County	1988 Population	Traffic Deaths		Traffic Injuries		Total Collisions	
		Number	Rate*	Number	Rate**	Number	Rate*
Over 1,000,000							
1. King	1,413,900	174	12.31	26,255	18.57	47,484	33.58
250,000 to 750,000							
1. Pierce	547,700	93	16.98	10,585	19.33	16,149	29.49
2. Snohomish	409,500	57	13.92	6,494	15.86	10,813	26.41
3. Spokane	354,100	47	13.27	5,354	15.12	8,969	25.33
100,000 to 250,000							
1. Clark	214,500	27	12.59	2,925	13.64	4,882	22.76
2. Yakima	186,300	48	25.76	2,098	11.26	4,253	22.83
3. Kitsap	177,300	19	10.72	2,259	12.74	3,614	20.38
4. Thurston	149,300	24	16.08	2,087	13.98	3,857	25.83
5. Whatcom	119,100	18	15.11	1,720	14.44	3,003	25.21
6. Benton	104,100	8	7.68	987	9.48	2,049	19.68
50,000 to 100,000							
1. Cowlitz	80,500	16	19.88	1,083	13.45	1,958	24.32
2. Skagit	70,800	28	39.55	1,097	15.49	1,893	26.74
3. Grays Harbor	63,400	20	31.55	951	15.00	1,838	28.99
4. Lewis	57,400	16	27.87	909	15.84	1,540	26.83
5. Clallam	54,400	12	22.06	574	10.55	1,165	21.42
6. Island	53,400	10	18.73	459	8.60	823	15.41
7. Grant	52,600	16	30.42	567	10.78	995	18.92
25,000 to 50,000							
1. Chelan	49,700	7	14.08	689	13.86	1,404	28.25
2. Walla Walla	48,300	14	28.99	493	10.21	937	19.40
3. Whitman	39,000	7	17.95	378	9.69	668	17.13
4. Mason	36,800	16	43.48	518	14.08	884	24.02
5. Franklin	35,500	10	28.17	446	12.56	863	24.31
6. Okanogan	31,700	16	50.47	419	13.22	708	22.33
7. Stevens	30,200	7	23.18	326	10.79	473	15.66
8. Kittitas	25,000	17	68.00	679	27.16	1,323	52.92
10,000 to 25,000							
1. Douglas	24,100	5	20.75	264	10.95	464	19.25
2. Jefferson	18,600	7	37.63	263	14.14	442	23.76
3. Pacific	17,600	3	17.05	274	15.57	427	24.26
4. Asotin	17,400	1	5.75	113	6.49	231	13.28
5. Klickitat	16,600	9	54.22	198	11.93	331	19.94
6. Adams	14,000	11	78.57	211	15.07	346	24.71
Under 10,000							
1. Lincoln	9,700	3	30.93	130	13.40	176	18.14
2. San Juan	9,600	2	20.83	88	9.17	136	14.17
3. Pend Oreille	8,800	5	56.82	140	15.91	201	22.84
4. Skamania	8,000	3	37.50	150	18.75	209	26.13
5. Ferry	6,100	7	114.75	97	15.90	151	24.75
6. Columbia	4,100	1	24.39	49	11.95	103	25.12
7. Wahkiakum	3,500	0	0.00	83	23.71	103	29.43
8. Garfield	2,400	1	41.67	37	15.42	55	22.92
TOTAL	4,565,000	785	17.20	72,449	15.87	125,920	27.58

*Frequency per 100,000 population
**Frequency per 1,000 population

Table 1-1:

COLLISION RATES BY CITY POPULATION
1988

City	1988 Population	Traffic Deaths*		Traffic Injuries*		Total Collisions*	
		Number	Rate**	Number	Rate***	Number	Rate**
250,000 and Over							
1. Seattle	495,900	46	9.28	9,285	18.72	18,511	37.33
100,000 to 250,000							
1. Spokane	170,200	14	8.23	3,166	18.60	5,716	33.58
2. Tacoma	161,400	23	14.25	3,765	23.33	6,176	38.27
50,000 to 100,000							
1. Bellevue	85,180	4	4.70	1,045	12.27	2,223	26.10
2. Everett	60,920	2	3.28	1,199	19.68	2,156	35.39
25,000 to 50,000							
1. Yakima	49,470	5	10.11	748	15.12	1,797	36.33
2. Bellingham	46,610	0	0.00	617	13.24	1,323	28.38
3. Vancouver	43,290	4	9.24	730	16.86	1,578	36.45
4. Kennewick	37,180	2	5.38	363	9.76	837	22.51
5. Bremerton	37,050	1	2.70	563	15.20	1,064	28.72
6. Renton	36,940	3	8.12	716	19.38	1,590	43.04
7. Kirkland	35,820	1	2.79	424	11.84	927	25.88
8. Kent	32,350	5	15.46	940	29.06	1,584	48.96
9. Redmond	31,710	1	3.15	469	14.79	889	28.04
10. Auburn	30,790	4	12.99	629	20.43	1,114	36.18
11. Olympia	30,270	5	16.52	570	18.83	1,266	41.82
12. Richland	30,140	1	3.32	278	9.22	571	18.94
13. Longview	29,560	2	6.77	511	17.29	880	29.77
14. Edmonds	28,500	0	0.00	311	10.91	540	18.95
15. Walla Walla	25,440	3	11.79	241	9.47	550	21.62
15,000 to 25,000							
1. Pullman	23,579	1	4.24	111	4.71	277	11.75
2. Lynnwood	22,641	0	0.00	693	30.61	1,319	58.26
3. Puyallup	20,840	1	4.80	350	16.79	698	33.49
4. Mercer Island	20,690	0	0.00	85	4.11	214	10.34
5. Wenatchee	18,860	1	5.30	254	13.47	574	30.43
6. Pasco	18,430	1	5.43	240	13.02	560	30.39
7. Port Angeles	17,350	3	17.29	190	10.95	450	25.94
8. Aberdeen	17,130	3	17.51	217	12.67	654	38.18
9. Lacey	16,380	0	0.00	234	12.45	483	23.87
10. Mountlake Terrace	16,290	0	0.00	124	7.61	254	15.59
10,000 to 15,000							
1. Mount Vernon	14,590	0	0.00	204	11.65	391	23.17
2. Oak Harbor	14,410	0	0.00	84	12.42	218	26.51
3. Des Moines	14,120	0	0.00	170	5.95	338	15.44
4. Centralia	11,850	1	8.44	179	5.57	382	14.68
5. Ellensburg	11,500	0	0.00	66	14.61	174	31.22
6. Kelso	10,880	0	0.00	168	11.40	359	25.64
7. Moses Lake	10,650	1	9.39	124	11.64	279	26.20
8. Anacortes	10,320	0	0.00	53	5.14	141	13.66
9. Bothell	10,205	0	0.00	94	9.21	215	21.07
TOTAL	1,799,435	138	7.67	30,210	16.79	59,272	32.94

*Does not include collisions on limited access roads or freeways

**Frequency per 100,000 population

***Frequency per 1,000 population

F. Collisions By Type

Multiple-vehicle collisions dropped ever so slightly in 1988 to 94,304 from 94,433 in 1987 (Figure 1-8). Single-vehicle collisions also decreased slightly (Figure 1-9). Vehicle-pedestrian collisions decreased 1.0% from 1987 (Figure 1-10). Vehicle-pedalcycle collisions dropped by 14.4% in 1988, reversing a five-year trend of increases in pedalcycle collisions (Figure 1-11).

Figure 1-8

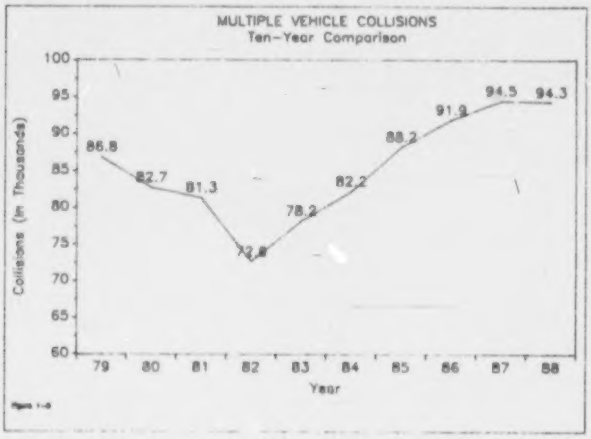


Figure 1-9

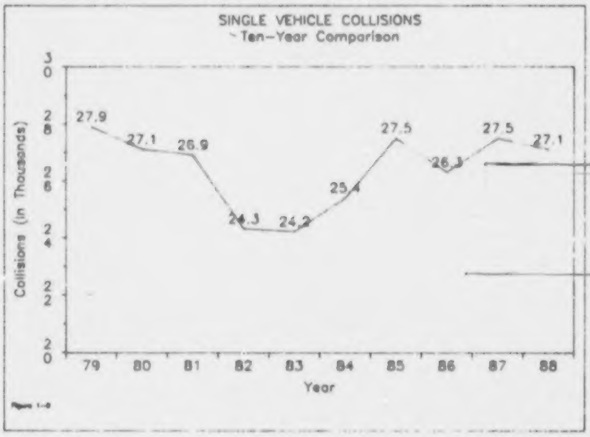


Figure 1-10

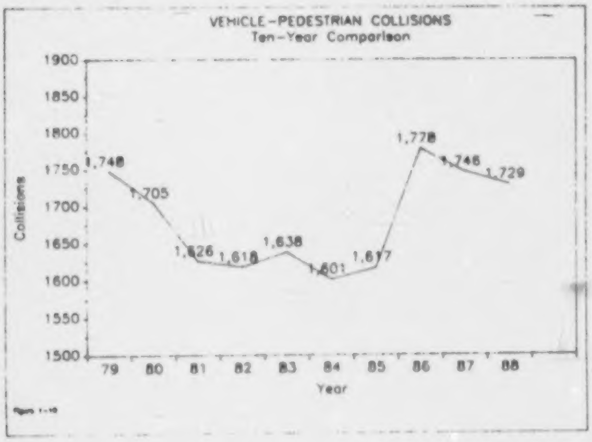


Figure 1-11

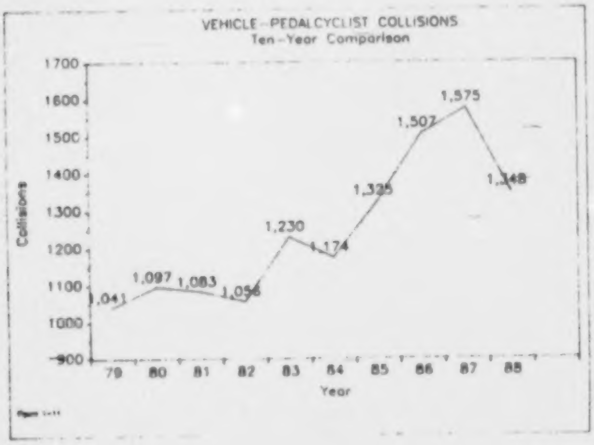
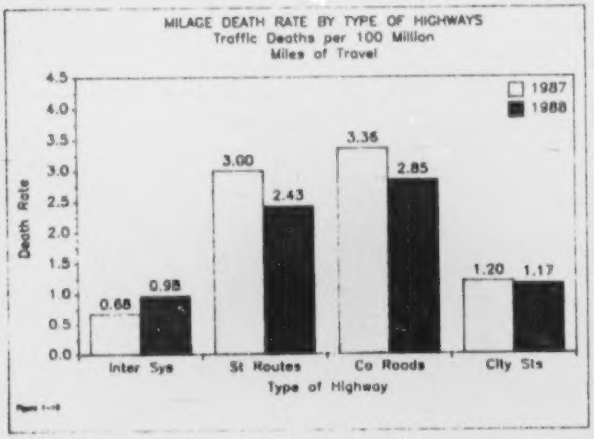


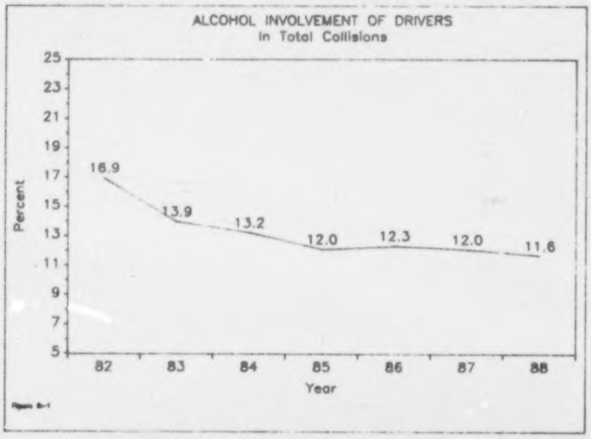
Figure 1-12



I. Alcohol Involvement

In 1988, 11.6% of all drivers involved in traffic collisions had been drinking alcohol. This is a 1.3% decrease from 1987 and continues a downward trend (Figure 2-1).

Figure 2-1



A. Drivers Involved In Fatal Collisions

In 1988, 40.6% of the drivers involved in statewide fatal collisions had been drinking intoxicants. This increased from the 36.4% involvement recorded in 1987 and from the 38.4% baseline period (Table 2-1). In rural areas, 42.0% of the drivers in fatal collisions had been drinking, up 7.05% from the 1984-87 average. In urban areas, 36.7 drivers out of every 100 had been drinking prior to being involved in a fatal collision. This is up 1.8% from the baseline period.

Table 2-1

SOBRIETY OF DRIVERS INVOLVED IN FATAL COLLISIONS
Statewide Comparison

Condition of Driver (Sobriety)	Years 1988	1987	1986	1985	1984	Previous 4 Year Average	% of Change 88 - 4 Year Average
Had been drinking - ability impaired	340	296	306	292	307	300	13.24%
Had been drinking - ability not impaired	45	40	51	43	52	47	-3.23%
Had been drinking - sobriety unknown	15	24	13	11	11	15	1.69%
Had not been drinking	586	630	546	577	574	582	0.73%
Not stated	41	46	35	45	41	42	-1.80%
Total drivers drinking	400	360	370	346	370	362	10.65%
Total drivers - excluding not stated	986	990	916	923	944	943	4.53%
Total drivers	1,027	1,036	951	968	985	985	4.26%
No. drinking drivers per 100 involved	40.6	36.4	40.4	37.5	39.2	38.4	5.76%
No. drunk drivers per 100 involved	34.5	29.9	33.4	31.6	32.5	31.9	8.21%

B. Alcohol Involvement By Age Group

Drivers under 30 years of age continue to be over-represented in alcohol-related collision. The 16- to 20-year-old group composed 7.6% of all licensed drivers in the state in 1988 but were involved in 14.7% of all alcohol-related collisions. This age group was involved in nearly two times more alcohol-related collisions than the percentage of licensed drivers it represented by a ratio of 1.94 (Figure 2-2). The over-involvement ratio for drivers aged 21-24 was 2.46 in 1988. This continues a steady decrease over the past several years (Figure 2-3). Last year, the 25- to 29-year-age group was involved in 1.74 times more alcohol-related collisions than the percentage of licensed drivers the group represented (Figure 2-4). The age group 30-54 was under represented by a ratio of .76 (Figure 2-5), as were the age groups 55-64 by a ratio of .33 (Figure 2-6), and 65 years and older by a ratio of .17 (Figure 2-7).

Figure 2-2

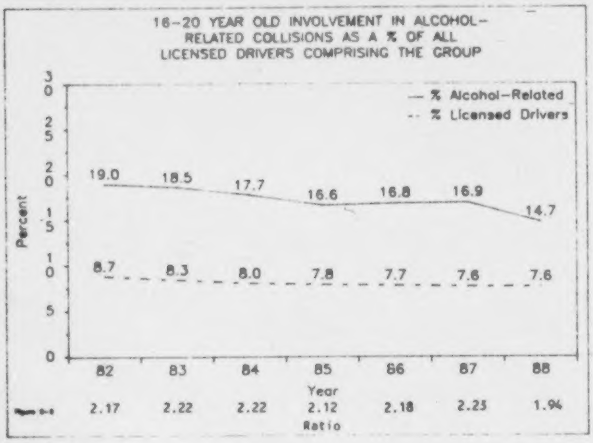


Figure 2-3

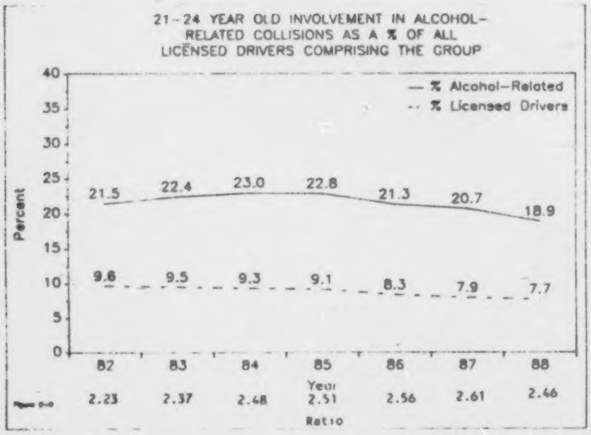


Figure 2-4

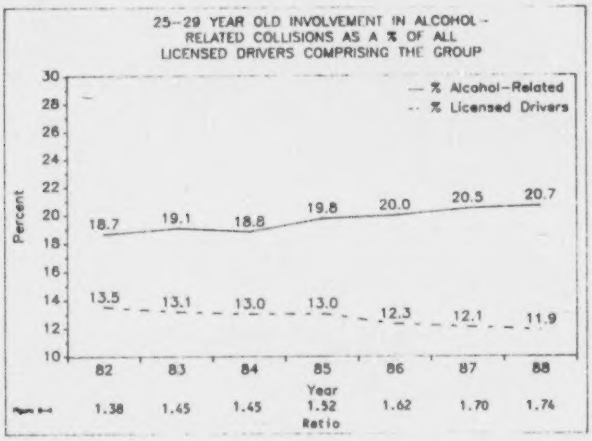


Figure 2-5

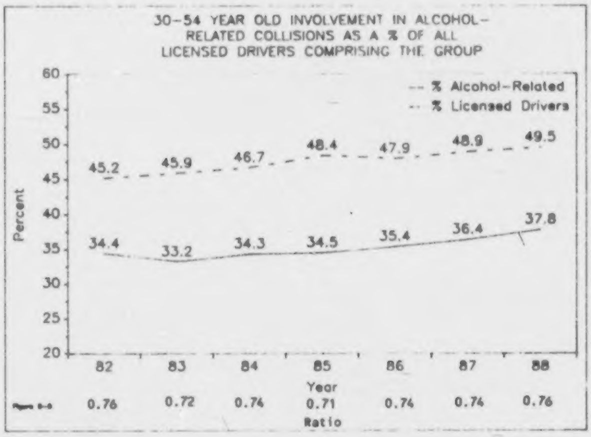


Figure 2-6

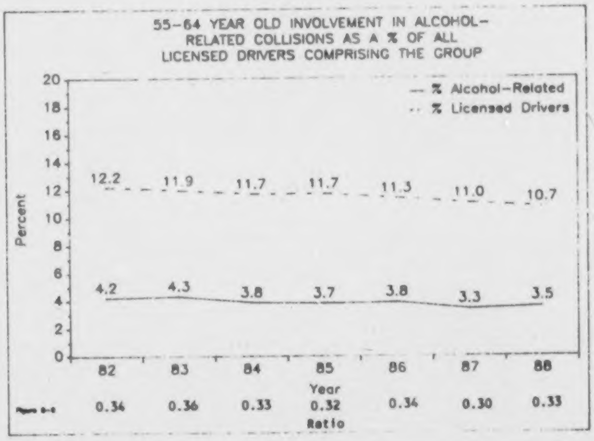
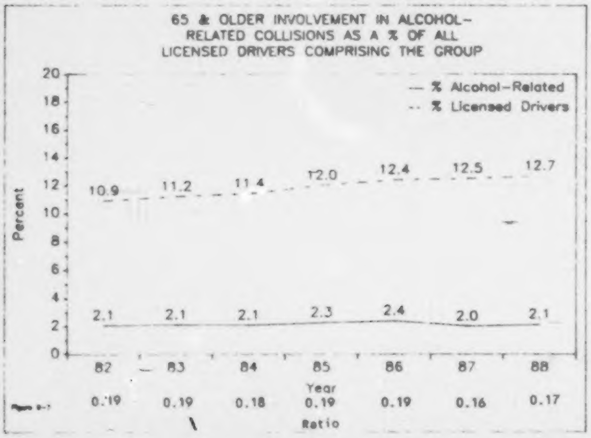


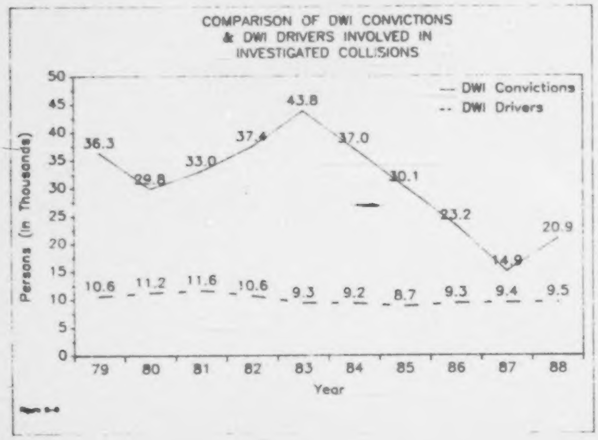
Figure 2-7



C. Ratio of Drinking and Drunk Drivers by Age and Severity

In 1988, the number of convictions for alcohol-related traffic offenses reversed a four-year downward trend starting in 1984. The 20,897 convictions in 1988 for DWI/Physical Control violations represented a drop of 52.3% from the 43,835 convictions recorded for the year of 1983. The number of DWI drivers involved in investigated collsions last year increased to 9,532, the highest number recorded since 1982 when 10,609 drivers were involved (Figure 2-8).

Figure 2-8



Data for all collision involvement by driver's age and percent of vehicle miles traveled for each age group reveal that the 16-17 year olds have the greatest over-representation in all reported collisions at 4.34. The 18-20 year olds were the second most over-represented group. The age group with the greatest under-representation based on miles traveled was the 55-64 category. Those in the 16- to 17-year-old bracket also displayed the greatest over-representation in alcohol-related collisions based on miles traveled. Second in this ranking was again the 18- to 20-year-old group. The age group 55-64 recorded the greatest under-representation in alcohol-involved collisions with a 0.31 ratio (Table 2-2).

Table 2-2

ALL REPORTED COLLISIONS & ALCOHOL-RELATED COLLISIONS
Comparison of Miles Traveled

Driver Age	% of Vehicle Miles Traveled*	Drivers in All Collisions		Alcohol-Related Collisions	
		%	Over/Under Ratio	%	Over/Under Ratio
16-17	1.44	6.25%	4.34	3.40%	2.36
18-20	5.55	12.04%	2.17	11.65%	2.10
21-24	12.58	12.71%	1.01	19.32%	1.54
25-34	29.24	27.22%	0.93	36.92%	1.26
35-44	21.18	18.73%	0.88	16.72%	0.79
45-54	12.97	9.47%	0.73	6.19%	0.48
55-64	11.58	6.53%	0.56	3.63%	0.31
65 & Over	5.34	7.05%	1.32	2.17%	0.41

Table 2-3 presents a summary of the number of persons killed and injured, number of property damage collisions, and total investigated collisions for drivers under the influence (legally drunk), all drinking drivers (had been drinking but not legally drunk), and non-drinking drivers. Of the non-drinking driver collisions, there were 10.7% fewer persons killed and 2.2% fewer received disabling injuries. Property-damage-only collisions also decreased, while persons with non-disabling and possible injuries increased in 1988. Of the drivers under the influence, persons killed and all levels of injury severity increased over last year. Property-damage-only collisions recorded a 4.3% increase, most likely due to the change in the reporting level. Total "DUI" collisions increased 0.4% overall. Alcohol-related (drivers who had been drinking) collisions showed a similar increase when compared to the previous year.

Table 2-3

SUMMARY OF PERSONS KILLED & INJURED IN ALCOHOL-RELATED COLLISIONS
Two-Year Comparison

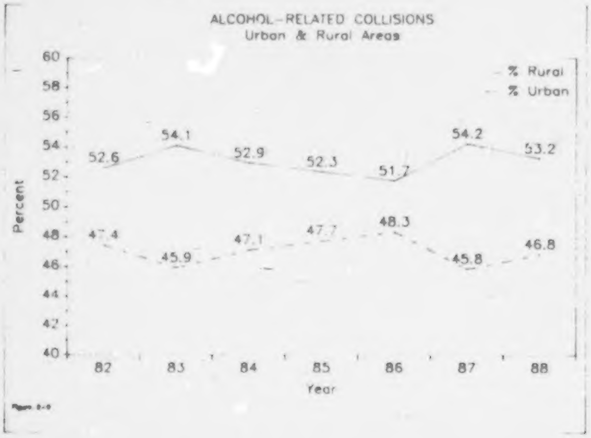
Status	Drivers Under the Influence			Drivers Who Had Been Drinking*			Non-Drinking Driver Collisions		
	1988	1987	% of Change	1988	1987	% of Change	1988	1987	% of Change
Persons Killed	376	337	11.6%	433	396	9.3%	352	394	-10.7%
Persons Injured	8,359	7,970	4.9%	13,724	13,539	1.4%	49,348	45,600	8.2%
Disabling	1,832	1,788	2.5%	2,665	2,665	0.0%	5,470	5,595	-2.2%
Non-Disabling	3,986	3,897	2.3%	6,418	6,573	-2.4%	17,835	17,288	3.2%
Possible Injury	2,541	2,285	11.2%	4,641	4,301	7.9%	26,043	22,717	14.6%
Property Damage Collisions**	3,867	4,040	-4.3%	8,129	8,496	-4.3%	48,517	50,078	-3.1%
TOTAL COLLISIONS**	9,436	9,398	0.4%	17,299	17,590	-1.7%	81,789	81,676	0.1%

*Including Drivers Under the Influence
**Minimum damage for a reportable collision was increased from $300 to $500 on 10-1-87.
***Investigated Collisions Only

D. Location of Alcohol-Related Collisions

Alcohol-related collisions continued to decrease in rural areas and an increase in the urban areas, a trend established in 1984. The exception was in 1987 when urban alcohol-related collisions recorded a decrease and the rural area collisions recorded an increase compared to 1986. In 1988, 53.2% of the alcohol-related collisions occurred in rural areas and 46.8% in urban areas (Figure 2-9).

Figure 2-9



E. Multiple- and Single-Vehicle Collisions

The predominant type of alcohol-related vehicle collisions continued to be multiple-vehicle mishaps in urban areas (Figure 2-10) and single-vehicle collisions in rural areas (Figure 2-11). In urban areas, 67.1% of the collisions involved two or more vehicles as apposed to only 33.7% on rural roads.

Figure 2-10

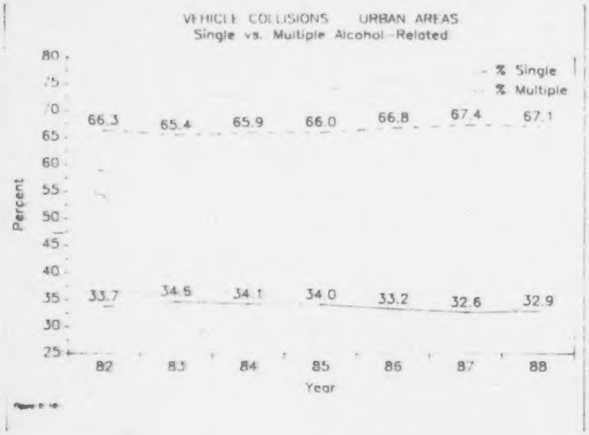
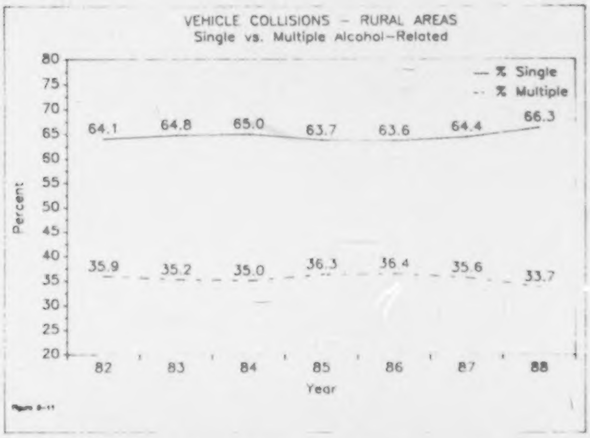


Figure 2-11



The percentage of all single-vehicle collisions where the driver had been drinking remained relatively stable at nearly half of the total alcohol-involved collisions for 1988. In comparison, single-vehicle collisions represented only 21.5% of the total collisions in 1988 (Figure 2-12). To express the over-representation of alcohol in single vehicle collisions the percentage of alcohol involvement in single-vehicle collisions is compared to the percentage of single-vehicle collisions in total vehicle collisions. This ratio increased slightly from 2.26 in 1987 to 2.27 in 1988.

Figure 2-12

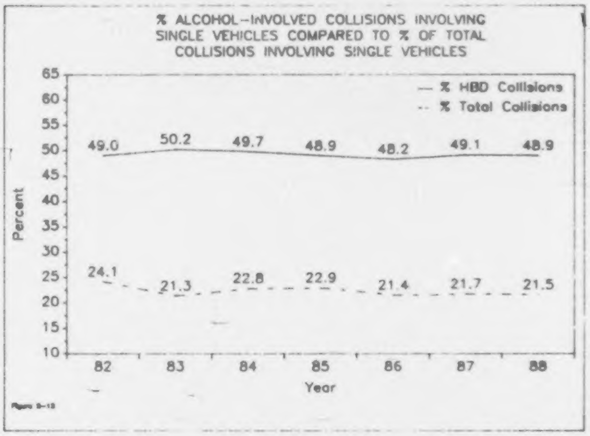


Figure 2-12 shows over-involvement of single-vehicle alcohol-involved collisions compared to single-vehicle collisions in total collisions.

F. Weekend Alcohol Involvement

The percentage of alcohol-related collisions occurred at 1.63 times more than all weekend collisions (Friday 6 p.m. to Sunday midnight). This dropped only slightly from the over-representation ratio registered for the previous four years (Figure 2-13). A further breakdown compares the percentage of alcohol-involved collisions occurring Friday and Saturday between the hours of 8 p.m. to 3 a.m. to the percentage of the total week's collisions occurring in the same time frame; the alcohol-related collisions are nearly 3 times over-represented. This is slightly above the over-representation ratio registered for the previous four years (Figure 2-14).

Figure 2-13

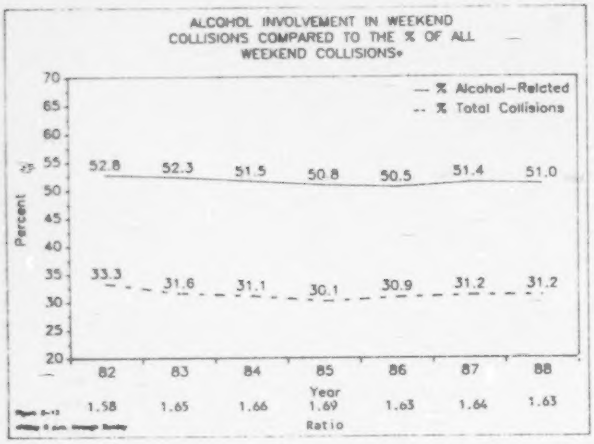
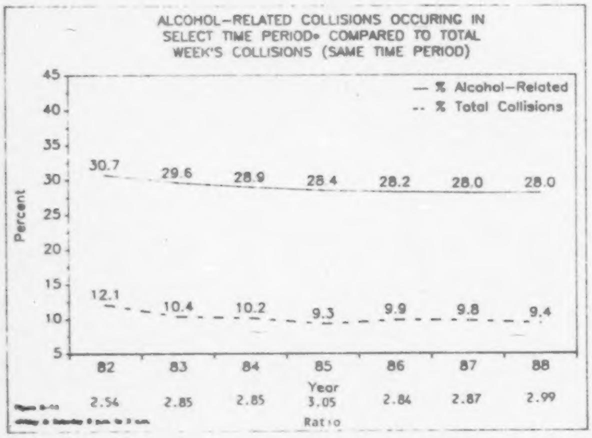


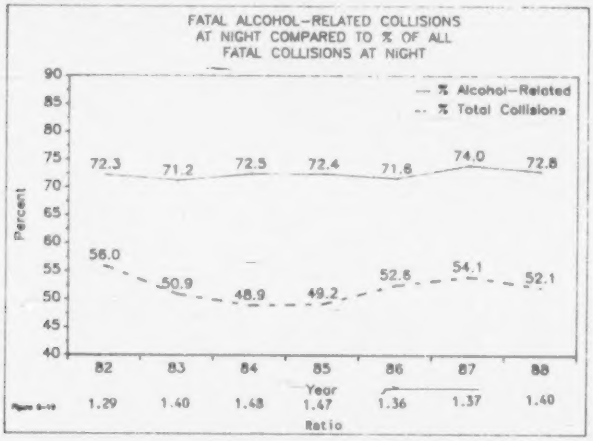
Figure 2-14



G. Fatal Alcohol-Involved Collisions Occurring At Night

The percentage of all nighttime fatal collisions involving alcohol to all alcohol-related fatal collisions increased during 1988 compared to the previous year and the four-year baseline, as did the percentage of all nighttime fatal collisions. All nighttime fatal collisions composed 52.1% of the year's total fatal collisions while alcohol-related nighttime fatal collisions reached 72.8% of the nighttime fatals. Alcohol-related fatal collisions at night over-represent all nighttime fatal collisions by a ratio of 1.40, down from the previous four-year period ratio (Figure 2-15).

Figure 2-15



H. Ratio of Drinking and Drunk Drivers Involved In Fatal Traffic Collisions and Roadway Type

Slightly over forty percent (40.6%) of all drivers in fatal collisions in 1988 had been drinking prior to the collision. This is a substantial increase from 36.4% the previous year and up slightly from the previous five-year average of 38.6% (Figure 2-16). Nearly twelve percent (11.6%) of the drivers involved in all investigated collisions had been drinking prior to the collision; a considerable drop from the 18.2 percent reported in 1981 (Figure 2-17).

Figure 2-16

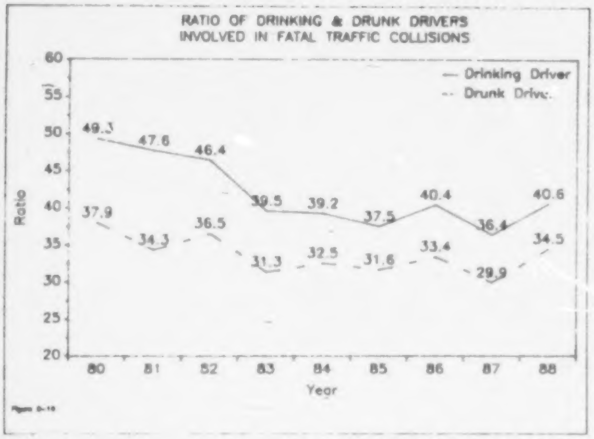
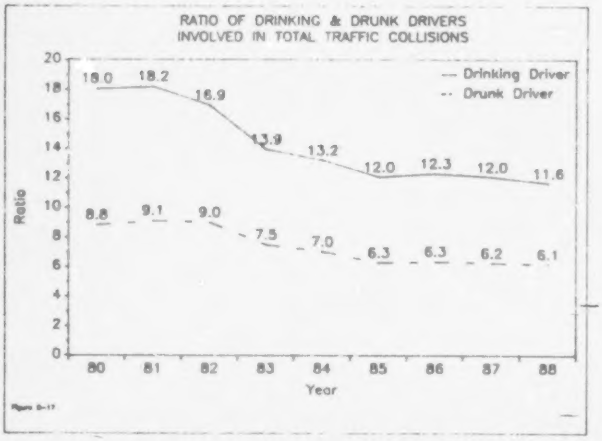


Figure 2-17



The total frequency of particular blood alcohol concentration (BAC) level in fatal and serious injury collisions from 1984 through 1988 by age group is presented in Table 2-4. The 16-20 and 21-24 age groups evidenced the greatest incidence of involvement for .05-.19 BAC levels. At the .15-.19 BAC range, the 21-24 age group had the greatest frequency of occurrences. At the .20-.24 BAC level, the 21-24 and 25-29 age groups had the greatest frequency of occurrences. At the .25-.29 BAC level, the 25-29 age group had the greatest frequency of occurrence followed closely by the 30-34 age group. Overall, the 16-20, 21-24, 25-29, and 30-34 age groups displayed the highest incidence of involvement at all BAC levels.

An analysis of roadway type by day of week on which alcohol-involved fatal and serious injury collisions occurred is given in Table 2-5. County roads accounted for 35.6% of the total weekly collisions compared to 27.2% for city streets. U.S. and state routes totaled 25.4% while the interstates and full-control access roads contributed to 10.5% of the weekly total of fatal and serious alcohol-involved collisions during 1988. The table also reveals that during this period of time, Saturday was the weekday with the greatest frequency of fatal and serious injury collisions involving alcohol. Sunday and Friday were the next highest days in that order. County roads recorded an increase in fatal and serious injury alcohol-related collisions since 1979, while city streets and U.S. and state routes recorded decreases (Figure 2-18).

Table 2-4

CHEMICAL TEST FOR INTOXICATION IN FATAL & SERIOUS INJURY COLLISIONS

Age	Alcohol Level							Test Given No Results	Test Refused	Total Tested
	.00-.04	.05-.09	.10-.14	.15-19	.20-.24	.25-.29	.30 & Up			
16-20	155	421	799	612	201	42	8	418	210	2,866
21-24	122	358	861	944	417	92	30	489	471	3,784
25-29	81	263	714	867	430	150	41	462	553	3,561
30-34	48	135	460	576	368	137	38	365	484	2,611
35-39	34	82	277	393	283	97	38	191	296	1,691
40-44	22	54	164	224	184	71	35	133	193	1,080
45-49	11	30	96	173	125	49	20	72	115	691
50-54	8	24	73	139	87	34	14	47	70	496
55-59	6	28	63	97	78	28	10	41	55	406
60-64	13	14	44	84	48	19	6	30	31	289
65-69	9	10	43	41	30	17	2	18	17	182
Over 69	9	17	44	30	22	7	0	20	9	158
TOTAL	518	1,436	3,638	4,180	2,273	738	242	2,286	2,504	17,815

Table 2-5

FATAL & SERIOUS INJURY COLLISIONS INVOLVING ALCOHOL
Roadway Type by Day of Week

Roadway Type	Day of Week								% of Total Weekly Collisions	% of Previous 4 Year Average
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total		
County Roads	223	196	226	227	435	590	454	2,351	35.6%	34.8%
City Streets	174	196	165	209	310	459	288	1,801	27.2%	30.0%
U.S. & State Routes	165	135	158	199	289	417	319	1,682	25.4%	24,5%
interstate & Full Control	49	64	73	89	123	165	130	693	10.5%	9.8%
Other Routes	11	6	5	7	12	23	20	84	1.3%	1.0%
Total	622	597	627	731	1,169	1,654	1,211	6,611	100.0%	100.0%
% of Total	9.4%	9.0%	9.5%	11.1%	17.7%	25.0%	18.3%	100.0%		
% of Change 88 - 4 Year Average	9.4%	9.4%	10.4%	11.6%	15.8%	24.7%	18.8%	100.0%		

Figure 2-18

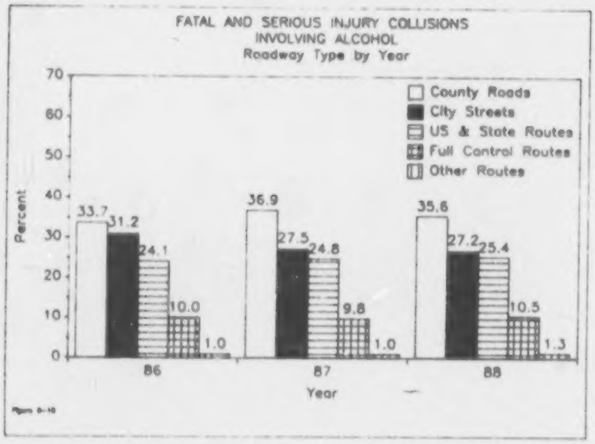


Table 2-6 depicts the number of persons killed and injured by drivers "under the influence" and who "had been drinking" by month for 1986, 1987, and 1988. The summer months typically show a higher incidence of persons killed and injured for both categories of alcohol-involved drivers. The exception was the month of March when 47 persons were killed by drivers who had been drinking, 42 of whom were killed by drivers under the influence.

Table 2-6

PERSONS KILLED & INJURED IN ALCOHOL-RELATED COLLISIONS BY MONTH
Three-Year Comparison

	Drivers "Under the Influence"						Drivers Who "Had Been Drinking"					
	Persons Killed			Persons Injured			Persons Killed			Persons Injured		
Month	1988	1987	1986	1988	1987	1986	1988	1987	1986	1988	1987	1986
January	17	16	18	491	523	505	18	19	21	866	861	832
February	27	25	9	554	488	475	28	27	11	876	849	816
March	42	26	25	669	617	702	47	31	31	1,053	1,061	1,112
April	27	24	30	684	656	574	36	31	33	1,130	1,110	1,006
May	39	28	38	785	748	647	47	32	41	1,284	1,257	1,142
June	47	44	32	722	662	606	50	47	40	1,133	1,130	1,093
July	37	29	37	842	715	723	45	40	40	1,372	1,266	1,306
August	30	41	36	715	823	760	35	46	39	1,170	1,405	1,407
September	35	33	22	687	730	664	38	39	31	1,173	1,151	1,241
October	27	34	36	756	690	744	32	36	39	1,321	1,194	1,219
November	30	27	28	684	710	786	35	31	31	1,126	1,181	1,294
December	18	10	20	770	608	637	22	17	25	1,220	1,090	1,049
TOTAL	376	337	331	8,359	7,970	7,823	433	396	382	13,724	13,555	13,517

II. Youth Involvement

Youthful drivers 24 years and younger were involved in 60,695 reported collisions, of which 290 were fatal collisions, and 25,809 were injury collisions during 1988. This was a 0.4% increase in reported collisions and an 8.1% increase in injury collisions, but a 4.1% decrease in fatal collisions compared to the four-year baseline. There were 497,527 licensed drivers 24 years old and younger in 1988: down slightly from the baseline period. The total collision rate (total collisions per 1,000 licensed drivers) of 12.20 for 1988 was up slightly from the 12.16 rate for the baseline average (Table 3-1).

Table 3-1

YOUTHFUL DRIVERS (24 YEARS & YOUNGER) INVOLVED IN COLLISIONS
Five-Year Comparison

Collisions & Rates	Years					Previous 4 Year Average	% of Change 88 - 4 Year Average
	1988	1987	1986	1985	1984		
Youthful drivers involved in							
Total Collisions	60,695	63,531	61,568	59,465	57,361	60,481	0.4%
Fatal Collisions	290	286	283	316	324	302	-4.1%
Injury Collisions	25,809	22,834	25,462	23,951	23,242	23,872	8.1%
Licensed Drivers	497,527	490,144	485,889	504,107	512,407	498,137	-0.1%
Fatal Collision Ratio*	4.78	4.50	4.60	5.31	5.65	5.02	-4.7%
Fatal Rate**	0.58	0.58	0.58	0.63	0.63	0.61	-3.9%
Total Collision Rate***	12.20	12.96	12.67	11.80	11.19	12.16	0.4%

* Fatal Collisions per 1,000 total collisions
** Fatal Collisions per 1,000 licensed drivers
*** Youthful drivers involved per 100 licensed

A. Youthful Drivers Involvement In Collisions By First Harmful Event

In 1988, 74.9% of those drivers age 24 years and younger involved in collisions collided with other moving vehicles. This type of collision also resulted in the greatest percentage of fatal collisions (43.5%) and injury collisions (71.7%). Single-vehicle collisions with fixed objects led to the second highest percentage of youthful driver involvement in total, fatal and injury collisions: at 15.3%, 28.4% and 16.1% respectfully (Table 3-2).

Table 3-2

COLLISIONS INVOLVING YOUTHFUL DRIVERS
By First Harmful Event

Type of Collision	Total Collisions		Fatal Collisions		Injury Collisions	
	Number	% of Total	Number	% of Total	Number	% of Total
Collision with other moving motor vehicles	39,969	74.9%	118	43.5%	16,217	71.7%
Collision with parked vehicle	1,682	3.2%	5	1.8%	467	2.1%
Collision with fixed/other object	8,170	15.3%	77	28.4%	3,651	16.1%
Overturning & other non-collision	2,548	4.8%	39	14.4%	1,517	6.7%
Collisions with pedestrians & pedalcyclists	714	1.3%	29	10.7%	679	3.0%
Other collisions - animal & R.R. train	292	0.5%	3	1.1%	76	0.3%
TOTAL	53,375	100.0%	271	100.0%	22,607	100.0%

B. Youthful Collision Involvement By Age Group

The 16- to 20-year-old age group was involved in 18.2% of all collisions. This group's over-representation ratio of 2.41 dropped from the 2.51 ratio for 1987. However, it is still the highest over-representation ratio for any age group (Figure 3-1). The 21- to 24-year-old age group decreased its over-representation ratio slightly from 1.67 to 1.65 (Figure 3-2). The 25-29 age group posted an over-representation ratio of 1.23, up from the previous year's 1.19 (Figure 3-3). The 30-54 age group continued to be under-represented in total collisions compared to this group's percentage of all licensed drivers, as is the 55-year-old and older age group (Figure 3-4 and 3-5).

Figure 3-1

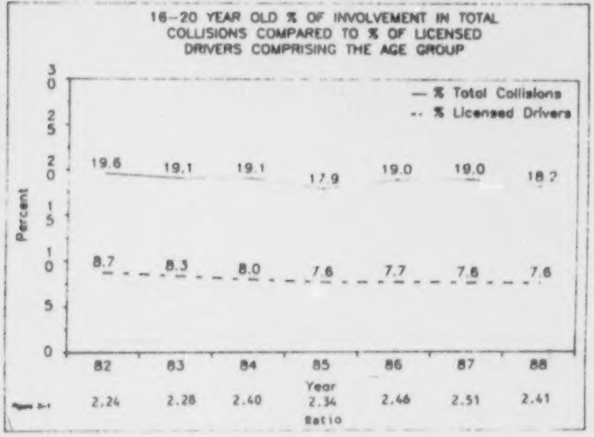


Figure 3-2

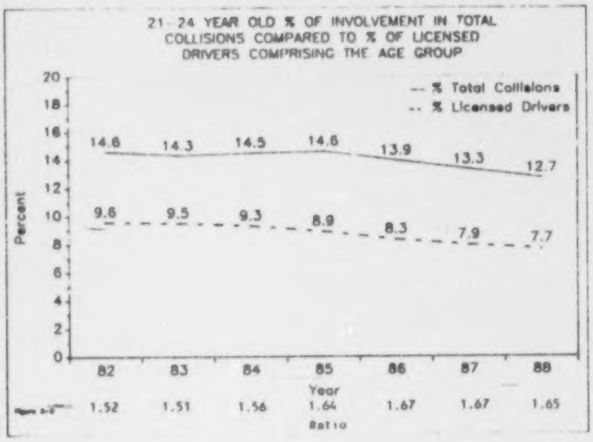


Figure 3-3

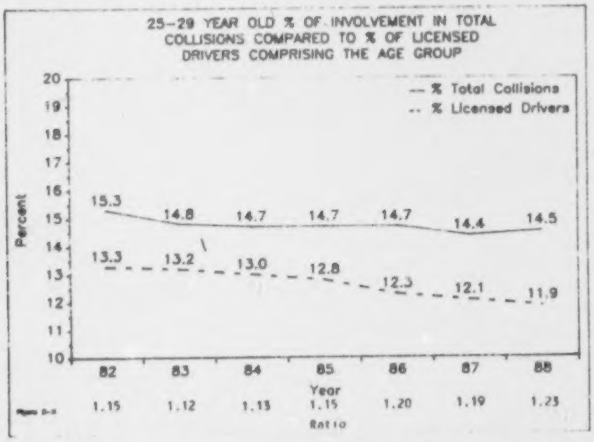


Figure 3-4

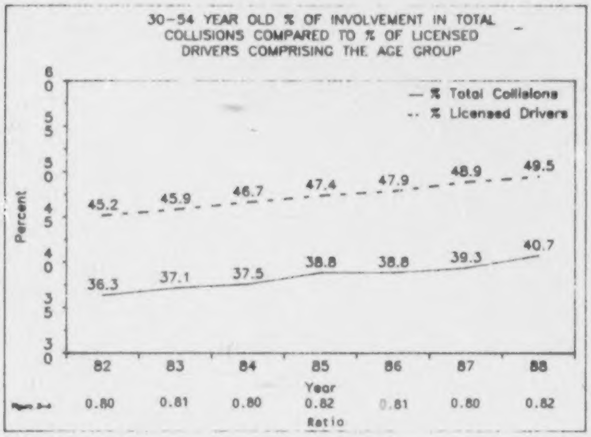
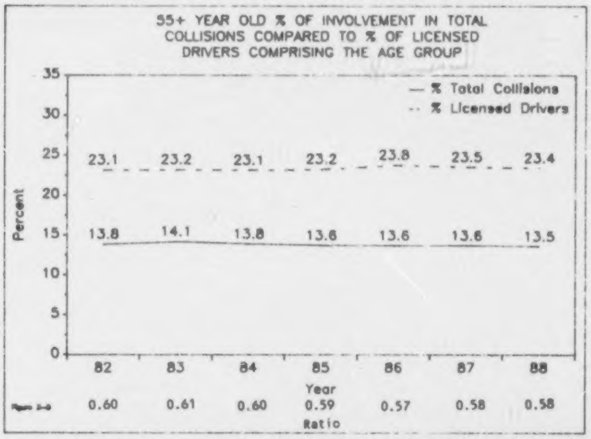


Figure 3-5



C. Collision Severity By Area For Youthful Drivers

In 1988, the urban and rural area collision mix remained virtually unchanged with the urban areas recording 59.9% of collisions involving youthful drivers (24 years old and younger). The rural areas contributed to 42.1% (Figure 3-6). Youthful driver injury collisions also remained unchanged in urban areas at 53.5% and rural areas at 46.5% (Figure 3-7). Youthful driver fatal collisions continued to be far more common in rural areas. In 1988, 76.8% of the fatal collisions involving youthful drivers occurred in rural areas, slightly lower than the 77.9% recorded in 1987 but higher than the 1982-1986 average. The urban areas recorded 23.2% of the fatal crashes, up from the 22.1% of the year earlier (Figure 3-8).

Figure 3-6

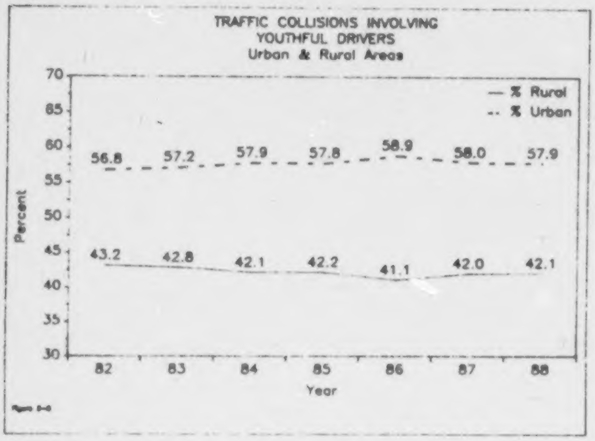


Figure 3-7

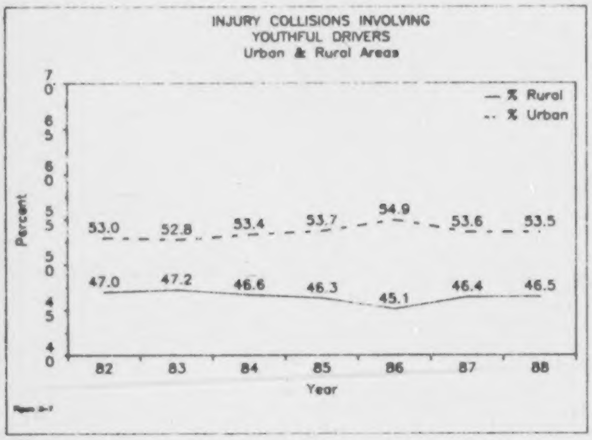
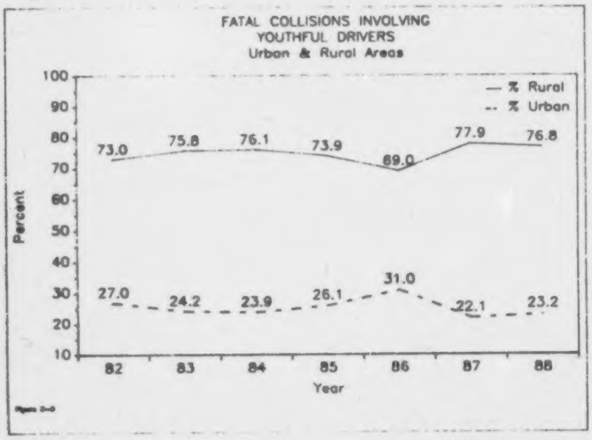


Figure 3-8



D. Youthful Driver Involvement By Time

In 1988, 19% of all the rural fatal collisions involving youthful drivers occurred on both Friday and Tuesday. The highest frequency, 19.5%, of all reported collisions also occurred on Friday (Figure 3-9). In urban areas, Friday also had the highest occurrence of fatal and all reported collisions involving youthful drivers (19%). Tuesday recorded 19% of the urban fatal collisions but only 14% of the total collisions for 1988 (Figure 3-10).

Figure 3-9

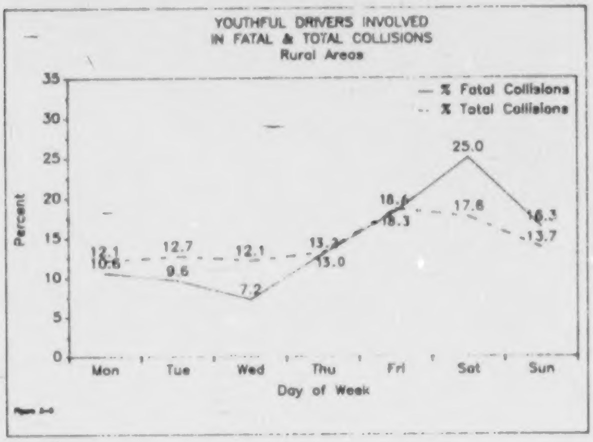
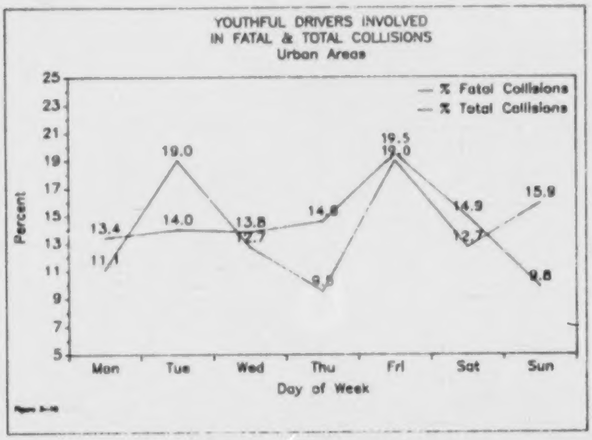


Figure 3-10



In rural areas, the greatest percentage (24.3%) of youthful driver involvement in fatal collisions occurred from 3:00 p.m. to 6:00 p.m.. The greatest percentage of total collision involvement (20.7%) for these drivers in rural collisions was from midnight to 3 a.m. (Figure 3-11). In the urban areas, the greatest youthful involvement by time period in fatal collisions was 23.8% from midnight to 3 a.m.. The 3 p.m. to 6 p.m. time period recorded 27.5% of the youthful drivers involved in total urban collisions (Figure 3-12).

Figure 3-11

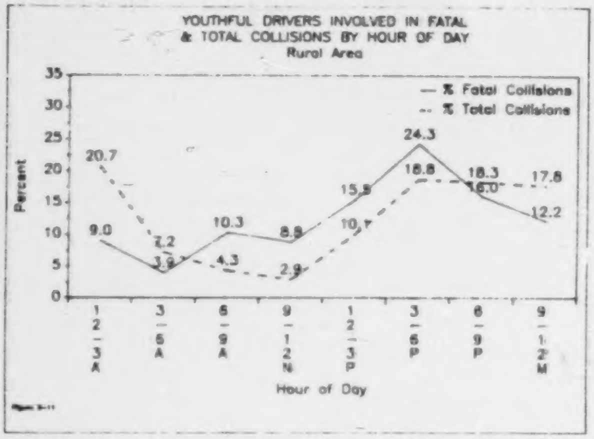
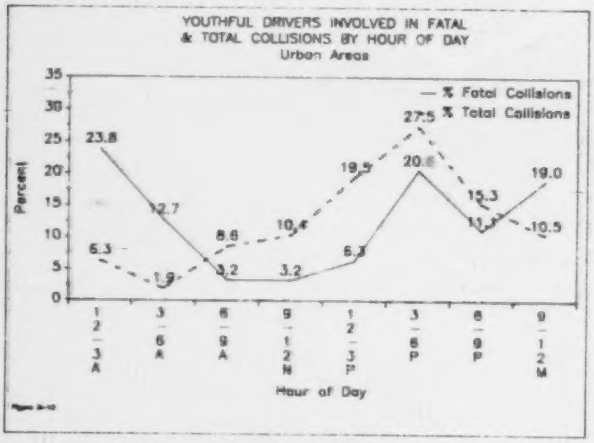


Figure 3-12



III. Safety-Restraint Usage

Out of a total of 202,054 occupants involved in total investigated collisions, 161,667 were using safety restraints. This is a usage rate of 80.0% and marks the fourth consecutive year of increases in safety-restraint usage since 1984 (Table 4-1).

Table 4-1

RESTRAINT USAGE RATE
Five-Year Comparison

Status	1988	%	1987	%	1986	%	1985	%	1984	%
Restraints Used	161,667	80.0%	152,413	77.6%	102,751	54.5%	60,392	35.1%	45,214	28.0%
No Restraints Used	40,387	20.0%	44,081	22.4%	85,669	45.5%	111,885	64.9%	116,299	72.0%
TOTAL	202,054	100.0%	196,494	100.0%	188,420	100.0%	172,277	100.0%	161,513	100.0%

Note: Usage rate is the percent of occupants using the restraints among all occupants involved in collisions for whom the usage is known.

Last year, 398 occupants who were not using any type of restraint died and 2,866 non-restrained occupants were seriously injured. Based on 1988 collision data, it is estimated that an occupant who does not "buckle up" is nine times as likely to be killed and over four times as likely to be seriously injured than one who does "buckle up" (Table 4-2).

Table 4-2

RESTRAINT USAGE & INJURIES SUSTAINED*
By Type

	Restraints Used		Child Restraints**		No Restraints		Total Occupants	
Type	Number	%	Number	%	Number	%	Number	%
Deaths	152	0.1%	4	0.1%	405	1.0%	557	0.3%
Disabling Injuries	2,698	1.7%	22	0.8%	2,866	7.1%	5,564	2.8%
Evident Injuries	11,630	7.2%	147	5.4%	7,608	18.8%	19,238	9.5%
Possible Injuries	21,316	13.2%	172	6.3%	5,766	14.3%	27,082	13.4%
No Injuries	125,820	77.9%	2,375	87.3%	23,720	58.8%	149,540	74.0%
TOTAL	161,616	100.0%	2,720	100.0%	40,365	100.0%	201,981	100.0%

*Excludes cases where injury severity was not stated or where restraint use was unknown.
**Included with Restraints Used Category.

A. Restraint Usage by Sex and Age

In 1988 collisions, 85.5% of the female drivers used their restraints, while 80.3% of the male drivers used theirs. Female passengers used restraints at a rate of 78.5% compared to 70.9% for male passengers. The 0-5 age group had the highest restraint usage of any age group at 86.6%. The age group with the lowest usage rate was the 6-15 year olds at 74.2% (Table 4-3 and 4-4).

Examination of restraint usage by occupant age for 1988 reveals that the one-year-old and younger age group had the highest usage rate at 91.1%. The lowest rate of restraint usage (66.9%) was for 14-year-old occupants. Teenage occupants recorded the lowest usage rate of any group with 75.3% (Table 4-5).

Table 4-3

USAGE RATES BY SEX*
Five-Year Comparison

	Percent Used Restraints				
Occupant	1988	1987	1986	1985	1984
Male Driver	80.3	77.8	54.0	34.3	27.3
Female Driver	85.5	83.3	59.6	38.8	31.4
Male Passenger	70.9	69.0	46.7	29.4	26.4
Female Passenger	78.5	75.9	55.0	36.0	28.4

*Excludes occupants where restraint use was unknown

Table 4-4

USAGE RATES BY AGE*
Five-Year Comparison

Occupant	Percent Used Restraints				
	1988	1987	1986	1985	1984
Age 0-5	86.6	85.6	81.0	73.1	66.8
Age 6-15	74.2	72.5	51.5	31.3	24.9
Age 16-19	74.5	71.6	44.2	25.4	19.6
Age 20-24	75.8	72.7	47.5	28.5	22.0
Age 25-34	79.5	77.4	55.3	36.6	29.5
Age 35-64	85.0	82.9	60.6	39.7	32.0
Age 65 & Up	84.5	82.6	58.2	34.7	27.6

*Excludes occupants where restraint use was unknown

Table 4-5

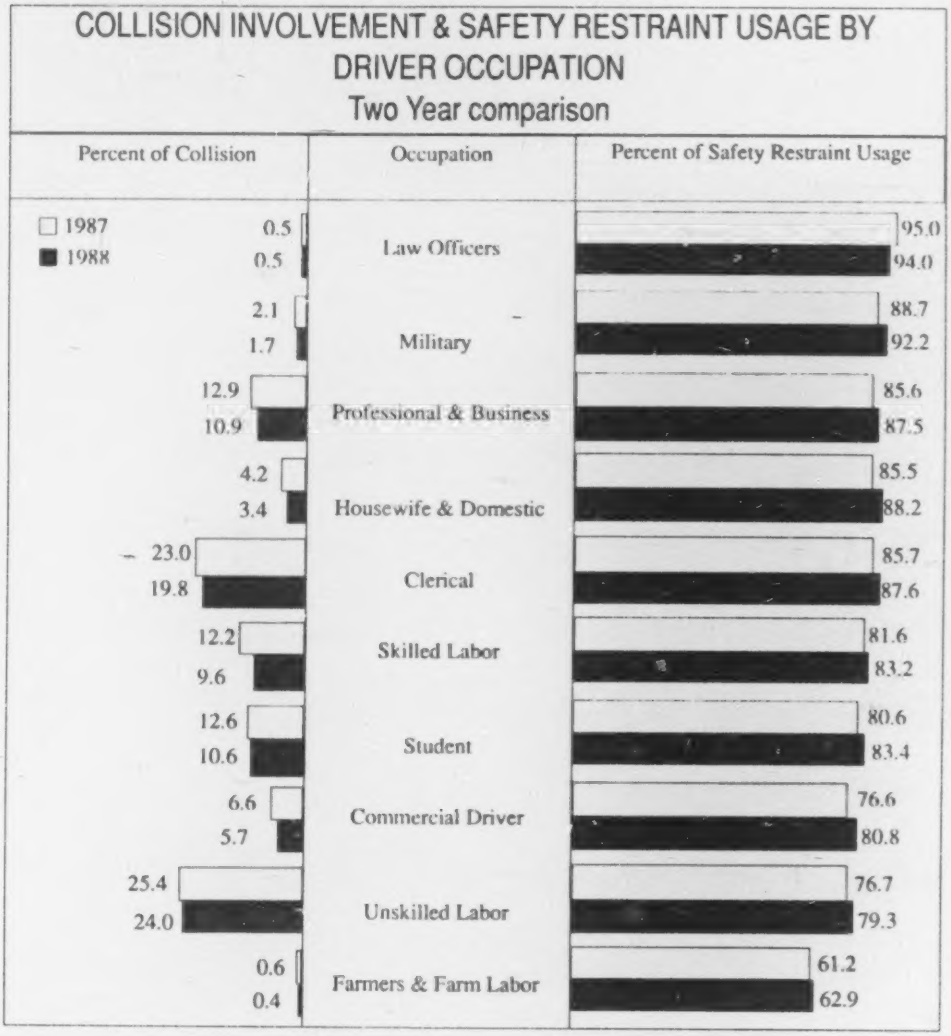
RESTRAINT USAGE
By Occupant Age

Age	Seat Belt Type					Total Restraints Used		Restraints Not Used	
	Lap Belt	Shoulder Belt	Lap & Shoulder Belt	Child Restraint	Air Bag Activated	Number	% of Total	Number	% of Total
Under 1	29	2	79	454	2	566	89.4%	67	10.6%
1	106	12	131	776	0	1,023	91.1%	100	8.9%
2	331	19	270	609	0	1,229	85.8%	204	14.2%
3	448	25	331	320	0	1,124	86.3%	178	13.7%
4	513	20	375	134	0	1,042	82.9%	215	17.1%
5	556	28	408	53	0	1,045	85.4%	178	14.6%
6	478	18	386	19	1	902	80.6%	217	19.4%
7	428	21	356	--	0	805	79.4%	209	20.6%
8	401	18	316	--	0	735	79.2%	193	20.8%
9	365	17	318	--	0	700	78.9%	187	21.1%
10	339	13	318	--	0	670	77.8%	191	22.2%
11	290	11	344	--	0	645	77.2%	190	22.8%
12	275	18	341	--	0	634	74.9%	212	25.1%
13	284	9	377	--	0	670	72.9%	249	27.1%
14	366	15	510	--	0	891	66.9%	441	33.1%
15	617	46	1,045	--	0	1,708	68.3%	793	31.7%
16	1,259	190	3,504	--	0	4,953	75.2%	1,636	24.8%
17	1,565	268	4,799	--	1	6,633	75.0%	2,211	25.0%
18	1,622	259	4,940	--	0	6,821	73.8%	2,425	26.2%
19	1,251	231	4,547	--	0	6,029	74.1%	2,106	25.9%
20	1,099	167	4,052	--	1	5,319	75.4%	1,731	24.6%
21 - 24	3,294	650	13,969	--	1	17,914	75.8%	5,719	24.2%
25 - 29	3,566	646	15,546	--	2	19,760	78.5%	5,419	21.5%
30 - 64	11,083	2,211	51,033	--	11	64,338	83.7%	12,529	16.3%
65 & Over	1,802	421	8,563	--	1	10,787	86.9%	1,626	13.1%
Age Unknown	657	114	2,044	245	0	3,060	77.4%	896	22.6%
TOTAL	33,024	5,449	118,902	2,608	20	160,003	80.0%	40,122	20.0%

B. Restraint Usage by Driver Occupation

The usage rate of safety restraints by occupation of driver ranges from a high of 94.3% for law officers to a low of 62.9% for farmers and farm laborers. Usage rates for all occupations with the exception of law officers showed modest increases for 1988 (Figure 4-1).

Figure 4-1



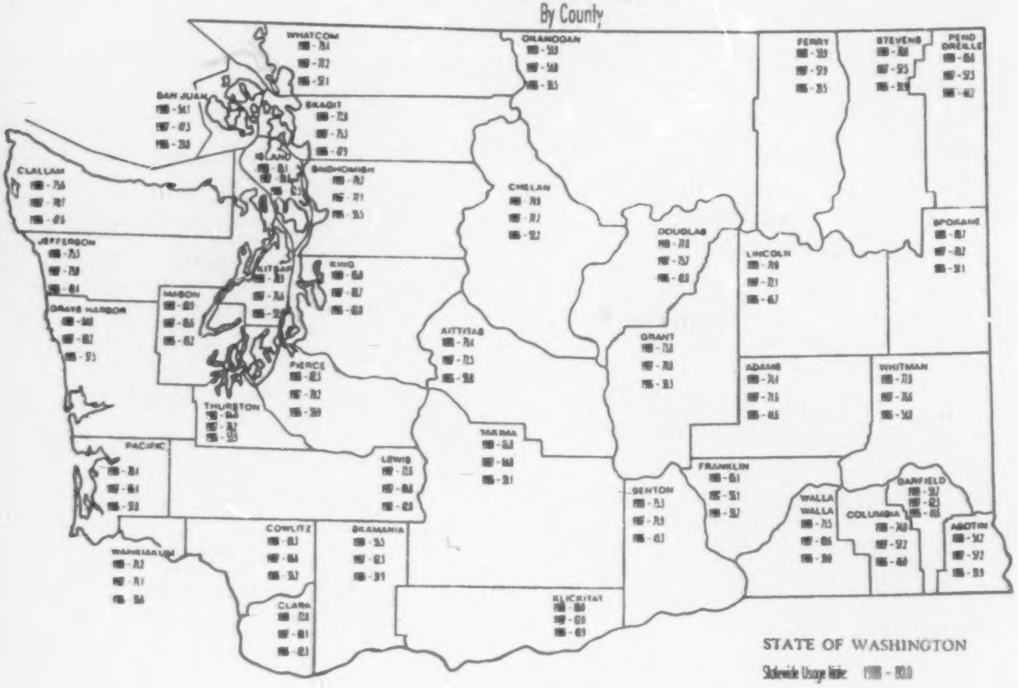
COLLISION INVOLVEMENT & SAFETY RESTRAINT USAGE BY DRIVER OCCUPATION

Two Year comparison

C. Restraint Use by County

A graphic depiction of restraint use by county is presented in Figure 4-2. Island County, at 85.1%, had the highest usage rate of all counties in the state in 1988. King County had the next highest usage rate at 85.0%. The two counties with the lowest usage rate was Ferry County and Okanogan County, each recording a usage rate of 53.9%: both down from the previous year.

Figure 4-2


WHATCOM
OKANOGAN
FERRY
STEVENS
PEND OREILLE
SAN JUAN
SKAGIT
ISLAND
SNOHOMISH
CLALLAM
JEFFERSON
CHELAN
DOUGLAS
SPOKANE
LINCOLN
KITSAP
KING
MASON
GRAYS HARBOR
KITTITAS
GRANT
PIERCE
THURSTON
ADAMS
WHITMAN
YAKIMA
PACIFIC
LEWIS
FRANKLIN
BENTON
WALLA WALLA
COLUMBIA
GARFIELD
ASOTIN
COWLITZ
SKAMANIA
WAHKIAKUM
CLARK
KLICKITAT

Occupant Restraint Usage Rate
By County

STATE OF WASHINGTON

Statewide Usage Rate: 1988 - 80.0
1987 - 77.6
1986 - 54.5

E. Restraint Use by Road and Vehicle Type

Freeway travel (interstates) and other controlled access routes had the highest usage rate by vehicle occupants at 86.5%. Occupants of vehicles traveling on all other roadways, which include forest service roads and recreational roads that are open to the public, recorded the lowest usage rate at 64.7%. (Table 4-6).

Table 4-6

RESTRAINT USAGE
By Functional Class of Roadway

Functional Class	1988	1987	1986	1985	1984
Interstate & limited	86.5%	84.6%	66.8%	49.6%	41.0%
Other state routes	79.8%	82.0%	56.0%	34.9%	28.9%
County Roads	75.0%	72.5%	50.5%	31.6%	24.3%
City Streets	80.7%	77.9%	52.6%	32.1%	26.4%
All others	64.0%	63.6%	41.8%	29.7%	24.8%

Examination of safety-restraint usage by vehicle type reveals modest increases in usage rates for all types of vehicles. Passenger cars recorded the highest usage rate at 81.6%. The classification of all other vehicles recorded the lowest rate at 68.3% (Table 4-7).

Table 4-7

RESTRAINT USAGE RATE BY TYPE OF VEHICLE DRIVERS
Five-Year Comparison

Type of Vehicle	1988	1987	1986	1985	1984
Passenger car	81.6%	78.9%	56.6%	36.8%	29.8%
Light Trucks	76.2%	73.1%	48.8%	29.8%	22.2%
Heavy Trucks	71.7%	67.7%	49.9%	27.3%	20.1%
All others	68.3%	69.5%	52.9%	34.6%	30.9%

government (federal agency) registered vehicles" involved in collisions. This is up 7.8% from the preceding year. The next highest usage rate was the 87.8% reported for "state government registered vehicles." Occupants of county registered vehicles had the lowest usage rate of occupants in all government owned vehicles at 75.8%, down from the 78.2% rate of the previous year (Table 4-8).

Table 4-8

RESTRAINT USAGE RATE BY TYPE OF GOVERNMENT VEHICLE
Five-Year Comparison

Type of Government Vehicle	1988	1987	1986	1985	1984
State registered vehicles	87.8%	93.8%	76.3%	77.4%	68.3%
County registered vehicles	75.8%	78.2%	63.8%	49.5%	43.6%
Municipal registered vehicles	79.4%	85.9%	66.3%	49.9%	41.4%
Other government registered vehicles	93.8%	87.6%	84.1%	68.3%	58.6%

E. Usage Rate by Proximity

Drivers residing within 15 miles of the collision scene recorded the lowest safety-restraint usage rate at 81.9%. Instate drivers residing over 15 miles of the collision scene recorded the highest usage rate of 84.0%. All categories continued to record increases in restraint usage over previous years (Table 4-9).

Table 4-9

RESTRAINT USAGE RATE BY PROXIMITY OF DRIVER RESIDENCE
Five-Year Comparison

Residence Proximity	1988	1987	1986	1985	1984
Resided within 15 miles of collision	81.9%	79.7%	55.5%	35.3%	28.2%
Resided over 15 miles	84.0%	80.4%	58.1%	38.9%	31.1%
Residing in other state	83.4%	79.1%	60.0%	41.3%	35.1%

F. Restraint Use by Seat Position

An examination of restraint usage by seat position reveals that drivers were the most frequent users at 82.1%. Occupants in the right front position were the next most frequent restraint users at 78.0%. Occupants riding in the mid-front used restraints the least at 54.8% (Table 4-10).

Table 4-10

RESTRAINT USAGE RATE BY OCCUPANT SEAT POSITION
Five-Year Comparison

Occupants	1988	1987	1986	1985	1984
Driver	82.1%	79.7%	55.9%	35.8%	28.6%
Mid-front	54.8%	51.8%	34.0%	21.2%	17.1%
Right-front	78.0%	74.9%	51.9%	31.9%	24.6%
Left-back	77.7%	74.9%	58.1%	42.6%	36.5%
Mid-back	66.7%	62.4%	44.4%	33.3%	25.7%
Right-back	77.8%	74.1%	58.0%	40.8%	34.6%
Other	29.0%	28.8%	21.5%	20.3%	13.0%
TOTAL	80.1%	77.6%	54.5%	35.1%	27.9%

Table 4-11 presents 1988 restraint usage by occupant age and seat position. Children aged 0-4 sitting in the right-back and left-back seats recorded the highest usage rate at 92.9% and 92.8% respectively. The 5-9 age group also used safety-restraints most frequently in the right-back (87.0%) and left-back (86.9%) seat positions. The seat position with the lowest reported usage rate for most age groups was the mid-front seat. The other seat position showing the second least restraint usage was the mid-back. The driver continued to "buckle up" more than any other occupant for those aged 15 through 64. The right-front occupant was the most frequent restraint user at 88.4% in the 65 and over age group.

Table 4-11

RESTRAINT USAGE RATE
By Occupant Age & Seat Position

Seat Position	Age							
	0-4	5-9	10-14	15-20	21-24	25-29	30-64	65 & Over
Driver	-	-	-	78.2%	78.5%	80.0%	84.7%	86.9%
Mid-front	77.1%	69.4%	55.5%	39.4%	39.4%	44.8%	55.5%	65.7%
Right-front	84.1%	85.2%	70.6%	72.4%	71.6%	75.7%	81.7%	88.4%
Left-back	92.8%	86.9%	76.1%	65.5%	58.1%	65.5%	73.1%	79.9%
Mid-back	58.8%	77.1%	67.6%	43.0%	34.7%	48.9%	50.3%	62.8%
Right-back	92.9%	87.0%	79.0%	67.4%	63.6%	64.1%	72.9%	84.5%
Other	49.0%	33.2%	31.5%	19.2%	15.2%	18.4%	28.1%	54.5%
Seat location unknown	60.0%	53.3%	56.6%	41.5%	40.4%	54.4%	47.5%	66.7%

F. Restraint Use by Severity of Collision

A more detailed breakdown of types of restraints used by injury severity is presented for 1988 in Table 4-12. Of 557 occupants killed in vehicle collisions, 405 (72.7%) were not using restraints. Of the 5,564 persons sustaining disabling injuries by collisions, 51.5% were using no restraints. No injuries were reported in investigated collisions for 62.2% of the occupants who were restrained with the combination lap/shoulder belts, an increase from the 57.9% reported for 1987 and 38.6% reported for 1986.

Table 4-12

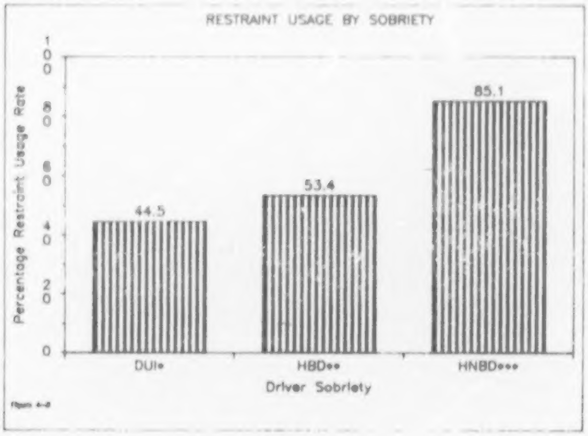
TYPES OF RESTRAINTS USED
By Severity of Injury

Type	Number Used		Deaths		Disabling Inj		Evident Inj		Possible Inj		No Injury	
	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Lap Belt	33,241	16.5%	34	6.1%	570	10.2%	2,747	14.3%	3,826	14.1%	26,064	17.4%
Shoulder Belt	5,477	2.7%	5	0.9%	96	1.7%	383	2.0%	588	2.2%	4,405	2.9%
Lap & Shoulder Belt	120,158	59.5%	109	19.6%	2,009	36.1%	8,350	43.4%	16,727	61.8%	92,963	62.2%
Child Restraint	2,720	1.3%	4	0.7%	22	0.4%	167	0.8%	172	0.6%	2,375	1.6%
Air Bag (Activated)*	20	0.0%	0	0.0%	1	0.0%	3	0.0%	3	0.0%	13	0.0%
No Restraints	40,365	20.0%	405	72.7%	2,866	51.5%	7,608	39.5%	5,766	21.3%	23,720	15.9%
TOTAL OCCUPANTS	201,981	100.0%	557	100.0%	5,566	100.0%	19,238	100.0%	27,082	100.0%	149,540	100.0%

*Less than 1/10 of 1 percent
**There were 73 cases where the injury was not stated.

Of all collision-involved drivers in 1988, those who had been drinking displayed a greater tendency not to use restraints than those drivers who had not been drinking. The latter category revealed a restraint-usage rate of 85.1% compared to a usage rate of 44.5% for drivers under the influence and 53.4% for drivers who had been drinking but were not under the influence (Figure 4-3).

Figure 4-3



IV. Motorcycle Collisions

Motorcycle fatal collisions decreased 10.0% in 1988, when compared to the previous four-year baseline average and 18.2% from the previous year. Total reported collisions decreased at even a greater rate, recording a 21.1% decrease from the baseline average. Injury collisions decreased 19.7% from the baseline average. 1988 registration totaled 117,155 motorcycles, a decrease of 6.1% from the baseline period. The motorcycle collision rate of 2.37 for 1988 was down

16.0% from the baseline rate of 2.82 motorcycle collisions per every 100 registered (Table 5-1).

Table 5-1

MOTORCYCLE COLLISIONS SUMMARY
Five-Year Comparison

Collision Severity/Exposure & Rates	Year 1988	1987	1986	1985	1984	Previous 4 Year Average	% of Change 88 - 4 Year Average
Total Collisions	2,773	3,379	3,508	3,699	3,477	3,516	-21.13%
Fatal Collisions	72	88	80	82	69	80	-9.72%
Injury Collisions	2,393	2,816	3,003	3,139	2,965	2,981	-19.72%
Motorcycle Registration	117,155	124,215	122,751	125,224	126,703	124,723	-6.07%
Fatal Collision Ratio*	26.0	26.0	22.8	22.2	19.8	22.7	14.30%
Fatal Registration Rate**	0.615	0.708	0.652	0.655	0.545	0.640	-3.96%
Total Collision Registration Rate***	2.37	2.72	2.86	2.95	2.74	2.82	-16.04%

* Fatal Collisions per 1,000 motorcycle collisions
** Fatal Collisions per 1,000 motorcycles registered
*** Motorcycle involved per 100 registered

A. Motorcycle Collisions By Age Group

The 16- to 29-year-old motorcycle rider continues to be over-represented in the accident population compared to the percentage of licensed motorcycle drivers comprising that age group. The 16-18 year olds were involved in 10.6% of the total collisions, but comprise less than 1% of the motorcycle-endorsed drivers. The 25- to 29-year-old motorcycle riders were involved in the largest percentage of fatal, injury, and total reported collisions (22.2%, 16.6%, and 16.8% respectively). However, they made up 14.7% of the licensed operators with motorcycle endorsements. From age 30 on up, motorcycle riders are under-represented (Table 5-2).

Table 5-2

MOTORCYCLE DRIVERS
Comparison of Collisions to Licensed Drivers

Age	Fatal Collisions Number	%	Injury Collisions Number	%	Total Collisions Number	%	% of Endorsed Drivers	Over/Under Ratio in Total Collisions
Under 16	0	0.0%	51	2.2%	55	2.1%	0.00	---
16	1	1.4%	31	1.3%	37	1.4%	0.04	35.14
17-18	9	12.5%	218	9.3%	243	9.2%	0.55	16.79
19-20	7	9.7%	354	15.1%	400	15.2%	1.77	8.59
21-22	2	2.8%	282	12.0%	303	11.5%	2.83	4.07
23-24	6	8.3%	219	9.3%	250	9.5%	3.87	2.45
25-29	16	22.2%	390	16.6%	441	16.8%	14.68	1.14
30-34	11	15.3%	268	11.4%	307	11.7%	20.69	0.56
35-39	6	8.3%	223	9.5%	241	9.2%	18.80	0.49
40-44	8	11.1%	152	6.5%	174	6.6%	13.44	0.49
45-54	4	5.6%	100	4.3%	115	4.4%	13.57	0.32
55-64	2	2.8%	44	1.9%	48	1.8%	6.55	0.28
65 & over	0	0.0%	18	0.8%	18	0.7%	3.20	0.21

B. Motorcycle Collisions By Location

Table 5-3 displays a breakdown of motorcycle collision data totals for urban and rural areas as well as statewide for 1988 and 1987. In 1988, rural areas again led urban areas in the total number of fatal collisions, 47 to 25, while urban areas led rural areas in total number of injury collisions, 1,247 to 1,146.

Table 5-3

MOTORCYCLE COLLISIONS BY LOCATION
Two-Year Comparison

Severity of Collision	1988			1987		
	Urban	Rural	Statewide	Urban	Rural	Statewide
Total Collisions	1,468	1,305	2,773	1,845	1,534	3,379
Fatal Collisions	25	47	72	27	61	88
Injury Collisions	1,247	1,146	2,393	1,486	1,330	2,816
Property-damage-only Collisions	196	112	308	332	143	475
Total Fatalities	28	49	77	27	63	90
All Persons Injured	1,481	1,415	2,896	1,821	1,676	3,497
Motorcyclists Killed	28	49	77	27	63	90
Motorcyclists Injured	1,396	1,341	2,737	1,702	1,586	3,288

A further breakdown of 1988 motorcycle collisions by road type indicates that 49.7% of the total collisions, 48.7% of the injury collisions, and 27.8% of the fatal collisions occurred on city streets. County roads accounted for 36.1% of the fatal collisions, 29.8% of the injury collisions, and 29.1% of the total collisions. All state routes (interstates, U.S. and state routes, and numbered roads) recorded 31.9% of the fatal, 20.3% of the injury and 19.9% of the total reported motorcycle collisions (Table 5-4).

Table 5-4

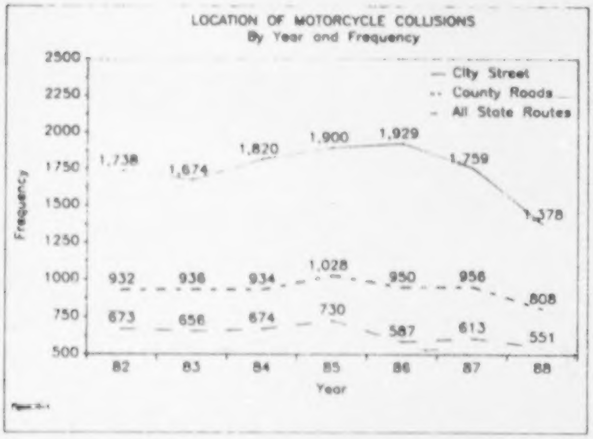
MOTORCYCLE COLLISIONS
By Location

Location	Collisions				Persons	
	Total	Fatal	Injury	P.D. Only*	Killed	Injured
Interstate System	171	5	149	17	5	178
Other Full Control	43	1	37	5	1	42
U.S. Route No.**	69	5	59	5	5	78
State Route No.**	268	12	241	15	14	317
County Roads	808	26	713	69	26	860
City Streets***	1,378	20	1,165	193	23	1,386
Other Traffic Ways	36	3	29	4	3	35
Total	2,773	72	2,393	308	77	2,896

* Property Damage Only <
** Excluding city streets
*** Including U.S. and State Routes in Cities

Total frequency of motorcycle collisions occurring on city streets, county roads, and all state routes decreased during 1988. This continues a three-year trend. Motorcycle collisions occurring on state routes continued a downward trend, with a seven-year low of 551 collisions in 1988. County roads also recorded a seven-year low after a slight increase in 1985 and 1987 (Figure 5-1).

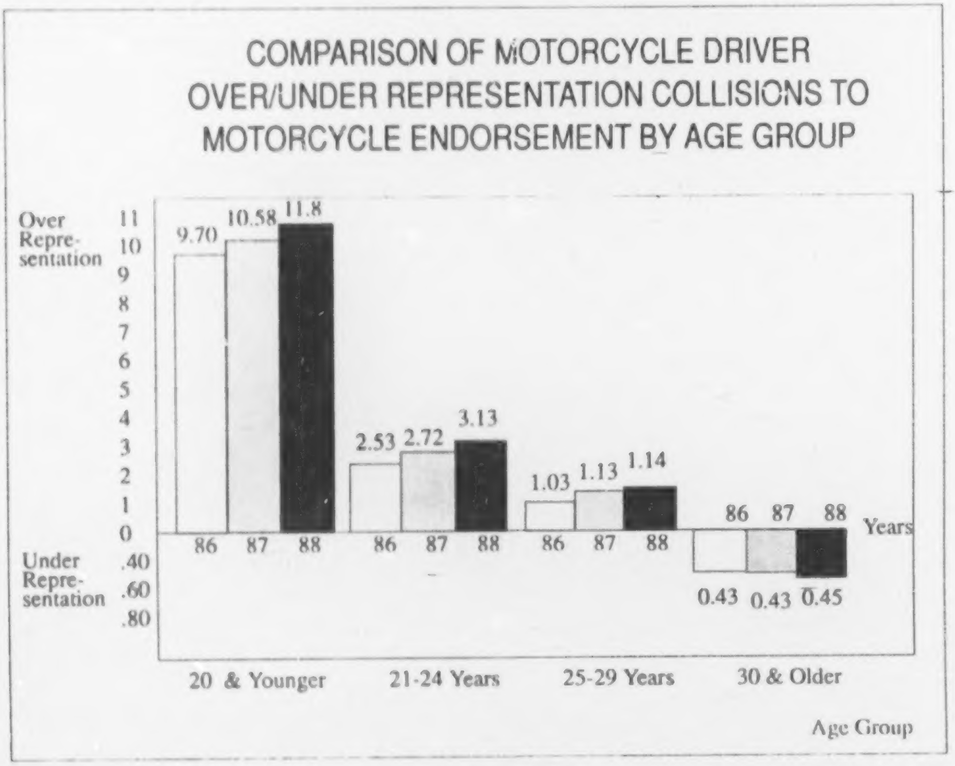
Figure 5-1



C. Principal Violations in Collisions By Age Groups

Figure 5-2 shows that motorcycle riders under 29 years of age, and particularly those 20 years old and younger, are over-represented in total motorcycle collision involvement when compared to the percentages of licensed motorcycle riders comprising these age groups. The 30 year old and over age group continue to be under-represented.

Figure 5-2



Speed too fast for conditions caused most of the motorcycle collisions for all age groups contributing to 28.9% of the year's motorcycle violations and was the prominent driver violation in all age groups. Driving while intoxicated was the second most prominent violation, contributing 14.1% to total motorcycle driver violations. Motorcyclists driving over the speed limit was the third leading violation, contributing to 12.2% of the violation total (Table 5-5).

Table 5-5

MOTORCYCLIST VIOLATIONS BY AGE
Investigated Collisions Only

Violation	Violations		Age of Violator							Number Not Stated
	Total	%	20 & Under	21-24	25-29	30-34	35-44	45-54	55 & Over	
Speed - Conditions	595	28.9%	196	131	92	58	70	15	14	21
Speed - Over Legal	252	12.2%	77	57	39	35	30	8	0	6
Failed to Yield	121	5.9%	43	22	19	7	8	3	4	15
D.W.I.	291	14.1%	61	57	70	58	48	8	4	5
Following Too Closely	126	6.1%	44	27	16	11	12	7	4	5
Improper Passing	134	6.5%	41	26	25	17	13	3	3	6
Operating Defective Equipment	96	4.7%	27	22	15	4	16	6	3	3
Disregard Signs/Signals	85	4.1%	23	19	15	11	10	1	1	5
Over Centerline	57	2.8%	16	12	9	5	10	1	1	3
Other Violations	305	14.8%	83	61	48	32	46	9	6	20
Total	2,062	100.0%	589	434	348	238	263	61	40	89

D. Motorcycle Collisions By First Harmful Event

The most common first harmful event causing collisions involving a single motorcycle was overturning. This cause predominated for all age groups. In multiple vehicle collisions involving motorcycles, the rear-end collision was most prevalent (15.1%). Angular collisions constituted the next most common event (13.9%) in multiple vehicle motorcycle collisions. Collisions occurring while entering or leaving a driveway contributed to 12.6% of all motorcycle collisions. (Table 5-6).

Table 5-6

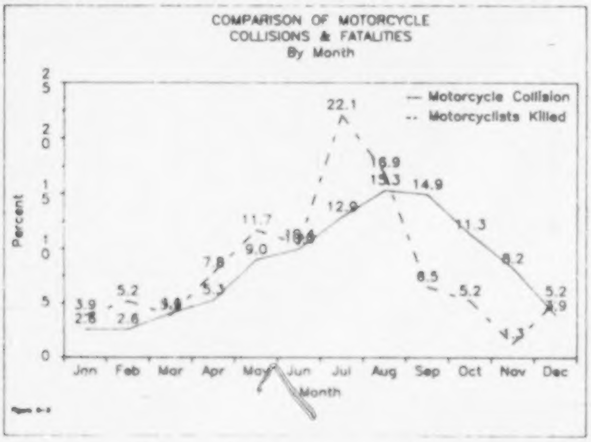
MOTORCYCLISTS INVOLVED IN TRAFFIC COLLISIONS
By First Harmful Event

Type of Collision	Collisions		Age of Motorcyclist						
	Total	%	20 & Under	21-24	25-29	30-34	35-44	45-54	55 & Over
Single Motorcycle Collision									
Struck Fixed Object	326	12.4%	82	65	66	42	59	6	6
Struck Other Object	21	0.8%	5	8	2	3	3	0	0
Overturned	636	24.2%	174	129	95	69	114	34	21
Motorcycle-Pedestrian	14	0.5%	4	4	2	0	1	2	1
Motorcycle-R.R. Train	0	0.0%	0	0	0	0	0	0	0
Motorcycle-Pedalcyclist	10	0.4%	2	4	1	1	1	1	0
Motorcycle-Animal	54	2.1%	14	9	8	2	12	6	3
Non-Collision	17	0.6%	6	4	3	2	1	1	0
Total Single Motorcycle Collisions	1,078	41.0%	287	223	177	119	191	50	31
Multiple Vehicle Collision									
Head-on	35	1.3%	12	5	7	3	7	1	0
Rear-end	398	15.1%	120	77	63	53	54	22	9
Sideswipe	139	5.3%	34	20	23	18	22	8	6
Angular Direction	366	13.9%	100	73	78	37	50	19	9
Enter/Leave Driveway	332	12.6%	103	72	54	40	50	8	5
One Left/One Straight-Opp. Dir.	189	7.2%	47	53	27	25	27	6	4
Other Multiple Vehicle Collision	95	3.6%	32	22	12	12	14	1	2
Total Multiple Vehicle Collisions	1,554	59.0%	448	330	264	188	224	65	35
TOTAL MOTORCYCLE COLLISIONS	2,632	100.0%	735	553	441	307	415	115	66

E. Time of Motorcycle Collision Occurrence

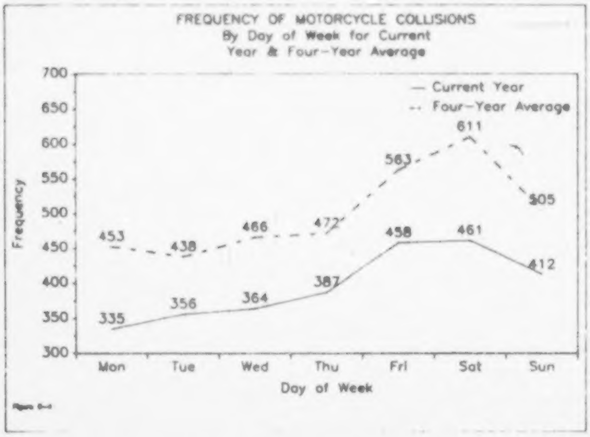
As one would expect, the milder weather months (June-October) of 1988 recorded the greatest percentage of motorcycle collisions. The highest frequency of fatalities occurred May through August (Figure 5-3).

Figure 5-3



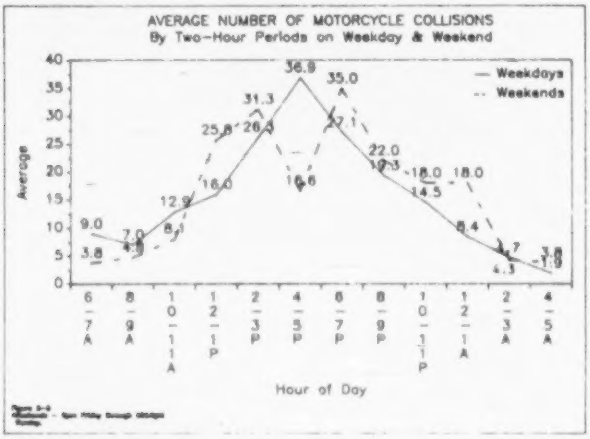
Friday and Saturday experience the greatest numbers of motorcycle collisions compared to other days of the week. This trend has been consistent throughout the four-year baseline period and continued in 1988 as well (Figure 5-4).

Figure 5-4



A further breakdown of motorcycle collisions by hour of day in 1988 reveals that the weekday hours from 2 p.m. to 8 p.m. constituted the most dangerous period of the day. The noon to 10 p.m. time frame proved to be the highest risk period for weekend motorcycling (Figure 5-5).

Figure 5-5



V. Pedalcycles

Total pedalcycle accidents decreased 3.4% from the previous four-year average in 1988. The number of pedalcyclists killed decreased from 18 deaths in 1987 to 12 in 1988 and was also down 9.4% from the baseline period. In addition, fewer persons received injuries than the previous year and from the previous four-year average (Table 6-1).

Table 6-1

PEDALCYCLE TRAFFIC COLLISIONS
Five-Year Comparison

Severity	Years					Previous 4 Year Average	% of Change 88 - 4 Year Average
	1988	1987	1986	1985	1984		
Total Collisions	1,348	1,575	1,507	1,325	1,174	1,395	-3.39%
Persons Killed	12	18	12	12	11	13	-9.43%
Persons Injured	1,375	1,584	1,538	1,354	1,204	1,420	-3.17%

A. Pedalcyclists Killed - By Age

In 1988, 41.7% of the pedalcyclists killed were in the 5-9 age bracket. This increased by two from the previous four-year average and by one from the previous year (Table 6-2).

Table 6-2

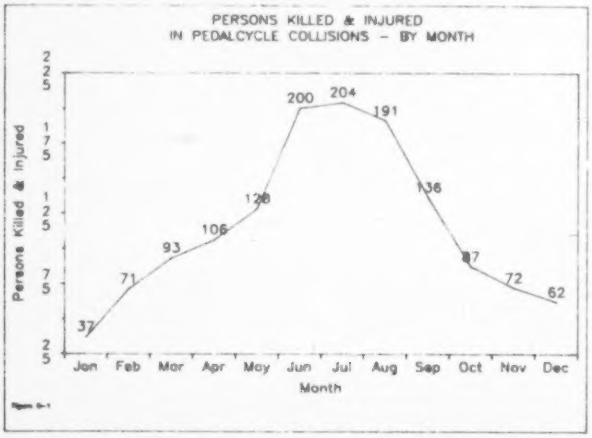
PEDALCYCLISTS KILLED BY AGE
Five-Year Comparison

Age	Years 1988	1987	1986	1985	1984	Previous 4 Year Average	% of Change 88 - 4 Year Average
0-4	0	0	2	0	0	1	-100.00%
5-9	5	4	2	3	1	3	100.00%
10-14	2	3	3	2	2	3	-20.00%
15-19	0	2	1	2	1	2	-100.00%
20-24	0	2	1	0	0	1	-100.00%
25-34	2	3	3	1	0	2	14.29%
35-44	2	1	0	1	3	1	60.00%
45-54	0	2	0	2	0	1	-100.00%
55-64	0	1	0	1	1	1	-100.00%
65-74	1	0	0	0	2	1	100.00%
75 & Older	0	0	0	0	1	0	-100.00%
Not Stated	0	0	0	0	0	0	---
TOTAL	12	18	12	12	11	13	-9.43%

B. Persons Killed and Injured in Pedalcycle Collisions

The months of May through September accounted for 61.9% of the persons killed and injured in pedalcycle-related collisions for 1988. (Figure 6-1).

Figure 6-1



The city of Walla Walla experienced the highest pedalcycle collision rate in the state during 1988 with 98.27 collisions per 100,000 population. Bellingham recorded the second highest collision rate in the state with 77.24 collisions per 100,000 population, followed by Olympia with 75.98 and Longview with 71.04 pedalcycle collisions per 100,000 population (Table 6-3).

Table 6-3

PEDALCYCLE COLLISION RATE BY POPULATION
Cities 15,000 Population & Greater

City	1988 Population	Pedalcycle Deaths		Pedalcycle Injuries		Total Ped Collision	
		Number	Rate*	Number	Rate*	Number	Rate*
250,000 and Over							
1. Seattle	495,900	1	0.20	215	43.36	220	44.36
100,000 to 250,000							
1. Spokane	170,200	0	0.00	100	58.75	96	56.40
2. Tacoma	161,400	0	0.00	85	52.66	82	50.81
50,000 to 100,000							
1. Bellevue	85,180	0	0.00	33	38.74	32	37.57
2. Everett	60,920	0	0.00	33	54.17	32	52.53
25,000 to 50,000							
1. Yakima	49,470	0	0.00	14	28.30	14	28.30
2. Bellingham	46,610	0	0.00	36	77.24	36	77.24
3. Vancouver	43,290	2	4.62	26	60.06	25	57.75
4. Kennewick	37,180	0	0.00	11	29.59	11	29.59
5. Bremerton	37,050	0	0.00	17	45.88	17	45.88
6. Renton	36,940	0	0.00	7	18.95	7	18.95
7. Kirkland	35,820	0	0.00	9	25.13	8	11.17
8. Kent	32,350	0	0.00	17	52.55	14	43.28
9. Redmond	31,710	0	0.00	15	47.30	15	47.30
10. Auburn	30,790	0	0.00	16	51.96	16	51.96
11. Olympia	30,270	0	0.00	22	72.68	23	75.98
12. Richland	30,140	0	0.00	3	9.95	3	9.95
13. Longview	29,560	1	3.38	20	67.66	21	71.04
14. Edmonds	28,500	0	0.00	9	31.58	9	31.58
15. Walla Walla	25,440	1	3.93	26	102.20	25	98.27
15,000 to 25,000							
1. Pullman	23,579	0	0.00	7	29.69	7	33.93
2. Lynnwood	22,641	0	0.00	10	44.17	10	22.08
3. Puyallup	20,840	0	0.00	13	62.38	10	33.59
4. Mercer Island	20,690	0	0.00	5	24.17	5	48.33
5. Wenatchee	18,860	0	0.00	7	37.12	7	21.21
6. Pasco	18,430	0	0.00	4	21.70	4	48.83
7. Port Angeles	17,350	1	5.76	8	46.11	9	34.58
8. Aberdeen	17,130	0	0.00	4	23.35	4	46.70
9. Lacey	16,380	0	0.00	8	48.84	8	48.84
10. Mountlake Terrace	16,290	0	0.00	6	36.83	6	36.83

*Frequency per 100,000 population

C. Rural - Urban Pedalcycle Collisions

Total pedalcycle collisions in 1988 were down in both rural and urban areas of the state. They recorded a 7.3% decrease in the rural areas and a 1.4% decrease in urban areas compared to the four-year baseline. Six persons were killed in rural areas in 1988, down four from the baseline. Six persons also died in urban pedalcycle collisions, an increase of two from the four-year average. Rural injuries from pedalcycle collisions were down 7.5% in 1988 from the baseline, and urban injuries decreased only 1% (Table 6-4).

In 1988, 67.4% of the pedalcycle collisions occurred in urban areas, continuing a slight downward trend from 1982's high of 69.6%. Rural areas experienced a one-year decrease in 1988 and continued a slight upward trend starting in 1982 (Figure 6-2).

D. Pedalcyclists Injured - By Age

The 10-14 age group received 16.7% of the injuries, as did the 25-34 and 35-44 age groups. Pedalcyclists between the ages of 5 to 19 made up 61.6% of the total injured, down from the 66.6% for this age group injured in the previous baseline period (Table 6-5).

Table 6-4

RURAL & URBAN PEDALCYCLE COLLISIONS
Five-Year Comparison

Severity by Areas	Years 1988	1987	1986	1985	1984	Previous 4 Year Average	% of Change 88 - 4 Year Average
Rural Areas							
Total Collisions	439	550	491	463	391	474	-7.34%
Persons Killed*	6	15	6	9	8	10	-36.84%
Persons Injured*	450	559	510	472	405	487	-7.50%
Urban Areas							
Total Collisions	909	1,025	1,016	862	783	922	-1.36%
Persons Killed*	6	3	6	3	3	4	60.00%
Persons Injured*	925	1,025	1,028	882	799	934	-0.91%

* In pedalcycle collisions by first harmful event.

Figure 6-2

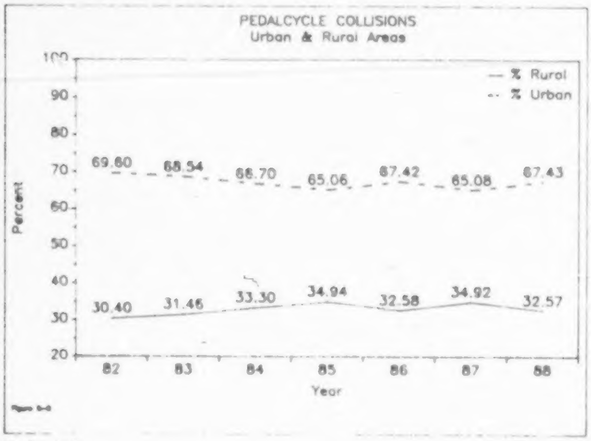


Table 6-5

PEDALCYCLISTS INJURED* BY AGE
Five-Year Comparison

Age	Years 1988	1987	1986	1985	1984	Previous 4 Year Average	% of Change 88 - 4 Year Average
0-4	23	23	18	31	19	23	1.10%
5-9	210	284	266	251	171	243	-13.58%
10-14	366	444	443	403	359	412	-11.22%
15-19	253	302	296	241	240	270	-6.21%
20-24	155	155	176	155	122	152	1.97%
25-34	156	166	170	143	147	157	-0.32%
35-44	71	63	56	38	35	48	47.92%
45-54	33	20	18	15	17	18	88.57%
55-64	18	13	12	8	8	10	75.6
65-74	8	17	7	2	11	9	-13.51
75 & Older	4	2	2	1	2	2	128.57%
Not Stated	49	63	43	37	41	46	6.52%
TOTAL	1,346	1,552	1,507	1,325	1,172	1,389	-3.10%

VI. Pedestrians

The 97 pedestrians were killed in 1988, an increase of 5.4% over the four-year average. Pedestrian injuries also increased 3.2% above the four-year baseline to 1,820 (Table 7-1).

Table 7-1

PEDESTRIANS KILLED AND INJURED STATEWIDE - URBAN & RURAL
Five-Year Comparison

Severity	Years 1988	1987	1986	1985	1984	Previous 4 Year Average	% of Change 88 - 4 Year Average
Pedestrians Killed	97	93	89	89	97	92	5.43%
Pedestrians Injured	1,820	1,830	1,752	1,763	1,710	1,764	3.19%

A. Pedestrians Killed And Injured - By Age

In 1988, four more pedestrians were killed than the 93 killed in 1987 and 5 more died than the four-year baseline average. The number of pedestrians aged 9 years and younger who were killed increased from 10 in 1987 to 14 in 1988 and increased by two over the previous four-year average. The number of 75 and older pedestrians injured also increased by two over the previous four-year average. The largest percentage of increase for pedestrians injuries during 1988 occurred in the 35-44 and the 0-4 age brackets, the former recording a 25.9% increase and the latter an 18.7% increase in comparison to the baseline average (Tables 7-2 and 7-3).

Table 7-2

PEDESTRIANS KILLED BY AGE
Five-Year Comparison

Age	Years 1988	1987	1986	1985	1984	Previous 4 Year Average	% of Change 88 - 4 Year Average
0-4	10	5	2	3	8	5	122.22%
5-9	4	5	4	11	6	7	-38.46%
10-14	3	6	2	3	8	5	-36.84%
15-19	10	7	10	3	6	7	53.85%
20-24	3	2	7	5	9	6	-47.83%
25-34	15	14	12	11	18	14	9.09%
35-44	12	11	13	9	8	10	17.07%
45-54	7	11	7	7	4	7	-3.45%
55-64	7	11	10	9	11	10	-31.71%
65-74	8	7	8	7	6	7	14.29%
75 & Older	15	14	14	21	13	16	-3.23%
Not Stated	3	0	0	0	0	0	0.00%
TOTAL	97	93	89	89	97	92	5.43%

B. Pedestrian Collisions By City Population

Table 7-4 presents the 1988 numbers and rates for pedestrian traffic deaths, injuries, and total collisions for cities of 15,000 population or more in Washington. Seattle had the greatest number of fatalities, but Kent had the highest rate of pedestrian fatalities at 6.18 per 100,000 population based on two pedestrian deaths. Seattle had the greatest number of pedestrian injuries and collisions but had the second highest rate for pedestrian injuries (95.38 per 100,000 population) and pedestrian collisions (94.17 per 100,000). Aberdeen experienced the highest pedestrian injury and collision rate with 99.24 and 105.08 per 100,000 population, respectively.

Table 7-3

PEDESTRIANS INJURED* BY AGE
Five-Year Comparison

Age	Years					Previous 4 Year Average	% of Change 88 - 4 Year Average
	1988	1987	1986	1985	1984		
0-4	97	92	77	83	75	82	18.65%
5-9	234	251	231	203	215	225	4.00%
10-14	197	196	198	195	194	196	0.64%
15-19	190	206	206	208	215	209	-8.98%
20-24	149	166	151	181	167	166	-10.38%
25-34	295	289	290	285	255	280	5.45%
35-44	210	196	176	169	126	167	25.94%
45-54	95	108	111	99	121	110	-13.44%
55-64	96	84	76	90	89	85	13.27%
65-74	74	83	72	92	89	84	-11.90%
75 & Older	91	76	98	82	80	84	8.33%
Not Stated	92	83	66	76	84	77	19.09%
TOTAL	1,820	1,830	1,752	1,763	1,710	1,764	3.19%

* In all traffic collisions.

C. Locations and Age Groups Of Pedestrian Collisions

In 1988, pedestrian fatalities in rural areas increased 10.9% from the previous four-year average and injuries were up 8.5%. Pedestrian fatalities in the urban areas remained the same as the baseline, however injuries increased 1.3% (Table 7-5).

D. Actions Of Pedestrians Killed and Injured

Thirty-six percent of the pedestrians killed or injured in rural areas in the state were struck while crossing the roadway not at an intersection. Another 20.1% were killed or injured while crossing at an intersection. The largest percentage of pedestrians in these groups were in the 5 to 14 year olds (Table 7-6).

E. Actions Of Pedestrians Killed and Injured

In urban areas, the most frequently involved age group in fatal and injury collisions fell into the 25- to 64-year-old group, which accounted for 38.1% of all pedestrians killed or injured in traffic collisions. The most common contributing action of this age group was "crossing, entering roadway at intersection." Of the 79 pedestrians four years of age or younger, 49 were killed or injured while crossing the roadway between intersections. Nearly one half (48.8%) of the pedestrians age 5-14 were also killed or injured while crossing between intersections (Table 7-7).

Table 7-4

PEDESTRIAN COLLISION RATE BY POPULATION
Cities 15,000 Population & Greater

City	1988 Population	Pedestrian Deaths		Pedestrian Injuries		Total Ped Collision	
		Number	Rate*	Number	Rate*	Number	Rate*
250,000 and Over							
1. Seattle	495,900	16	3.23	473	95.38	467	94.17
100,000 to 250,000							
1. Spokane	170,200	4	2.35	113	66.39	115	67.57
2. Tacoma	161,400	7	4.34	140	86.74	137	84.88
50,000 to 100,000							
1. Bellevue	85,180	0	0.00	24	28.18	24	28.18
2. Everett	60,920	0	0.00	47	77.15	41	67.30
25,000 to 50,000							
1. Yakima	49,470	2	4.04	26	52.56	26	52.56
2. Bellingham	46,610	0	0.00	34	72.95	30	64.36
3. Vancouver	43,290	1	2.31	27	62.37	26	60.06
4. Kennewick	37,180	0	0.00	7	18.83	7	18.83
5. Bremerton	37,050	0	0.00	25	67.48	25	67.48
6. Renton	36,940	0	0.00	14	37.90	12	32.49
7. Kirkland	35,820	0	0.00	8	22.33	7	19.54
8. Kent	32,350	2	6.18	20	61.82	19	58.73
9. Redmond	31,710	0	0.00	10	31.54	9	28.38
10. Auburn	30,790	1	3.25	18	58.46	20	64.96
11. Olympia	30,270	1	3.30	16	52.86	16	52.86
12. Richland	30,140	0	0.00	5	16.59	5	16.59
13. Longview	29,560	0	0.00	16	54.13	15	50.74
14. Edmonds	28,500	0	0.00	11	38.60	11	38.60
15. Walla Walla	25,440	0	0.00	[illegible]	31.45	6	23.58
15,000 to 25,000							
1. Pullman	23,579	0	0.00	2	8.48	2	8.48
2. Lynnwood	22,641	0	0.00	14	61.83	13	57.42
3. Puyallup	20,840	1	4.80	13	62.38	13	62.38
4. Mercer Island	20,690	0	0.00	1	4.83	1	4.83
5. Wenatchee	18,860	0	0.00	12	63.63	12	63.63
6. Pasco	18,430	1	5.43	10	54.26	11	59.69
7. Port Angeles	17,350	0	0.00	11	63.40	11	63.40
8. Aberdeen	17,130	1	5.84	17	99.24	18	105.08
9. Lacey	16,380	0	0.00	9	54.95	9	54.95
10. Mountlake Terrace	16,290	0	0.00	3	18.42	3	18.42

*Frequency per 100,000 population

Table 7-5

RURAL & URBAN PEDESTRIANS KILLED/INJURED
Five-Year Comparison

Severity by Area	Years					Previous 4 Year Average	% of Change 88 - 4 Year Average
	1988	1987	1986	1985	1984		
Rural Areas							
Pedestrians Killed	51	39	49	45	51	46	10.87%
Pedestrians Injured	497	468	432	483	449	458	8.52%
Urban Areas*							
Pedestrians Killed	46	54	40	44	46	46	0.00%
Pedestrians Injured	1,323	1,362	1,320	1,280	1,261	1,306	1.32%

* 2,500 population and greater

Table 7-6

ACTIONS OF PEDESTRIANS KILLED & INJURED
Rural Areas

Action	Killed		Killed/Injured		Age					Number Not Stated
	Number	%	Number	%	0-4	5-14	15-24	25-64	65+	
Rural:										
Crossing, entering roadway at intersection	6	11.8%	111	20.1%	4	36	22	36	9	4
Not at intersection	19	37.3%	196	35.6%	15	69	32	55	14	11
Walking with traffic	10	19.6%	29	5.3%	0	6	8	12	2	1
Walking against traffic	1	2.0%	12	2.2%	0	1	3	8	0	0
Standing or working in roadway	3	5.9%	45	8.2%	1	2	9	29	2	2
Playing in roadway	0	0.0%	14	2.5%	3	9	2	0	0	0
Lying in roadway	3	5.9%	5	0.9%	0	0	3	2	0	0
Not in roadway	9	17.6%	93	16.9%	5	9	23	68	5	3
Other & Not Stated	0	0.0%	46	8.3%	1	3	9	29	1	3
TOTAL RURAL	51	100.0%	551	100.0%	29	135	111	219	33	24
% of Total Killed or Injured					5.3%	24.5%	20.1%	39.7%	6.0%	4.4%

Table 7-7

ACTIONS OF PEDESTRIANS KILLED & INJURED
Urban Areas

Action	Killed		Killed/Injured		Age					Number Not Stated
	Number	%	Number	%	0-4	5-14	15-24	25-64	65+	
Urban:										
Crossing, entering roadway at intersection	18	39.1%	690	50.1%	17	117	119	301	106	30
Not at intersection	20	43.5%	422	30.6%	49	148	60	113	34	18
Walking with traffic	0	0.0%	17	1.2%	0	4	4	5	1	3
Walking against traffic	0	0.0%	13	0.9%	1	1	4	5	1	1
Standing or working in roadway	3	6.5%	72	5.2%	1	0	17	42	4	8
Playing in roadway	1	2.2%	18	1.3%	6	8	2	1	0	1
Lying in roadway	0	0.0%	0	0.0%	0	0	0	0	0	0
Not in roadway	2	4.3%	68	4.9%	4	7	17	30	5	5
Other & Not Stated	2	4.3%	77	5.6%	1	18	21	27	4	6
TOTAL URBAN	46	100.0%	1,377	100.0%	79	303	264	524	155	72
% OF TOTAL KILLED OR INJURED					5.7%	22.0%	17.7%	38.1%	11.3%	5.2%

F. Pedestrian Collisions By Day Of Week and Hour Of Day

In 1988, Friday and Monday were the two days with the highest frequency of pedestrian fatalities, recording 18.5% and 16.0% deaths respectively. Friday also recorded the highest number of reported pedestrian collisions (Figure 7-1). The 6 p.m. to 9 p.m. time period evidenced the greatest percentage of fatal pedestrian collisions at 23.4%. The 3 p.m. to 6 p.m. recorded the greatest number of reported pedestrian collisions at 28.8% (Figure 7-2).

Figure 7-1

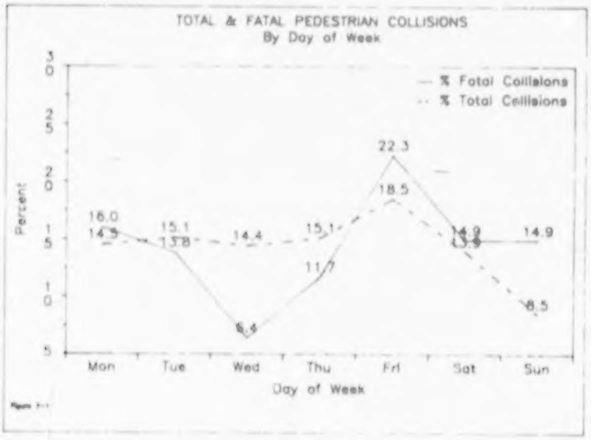
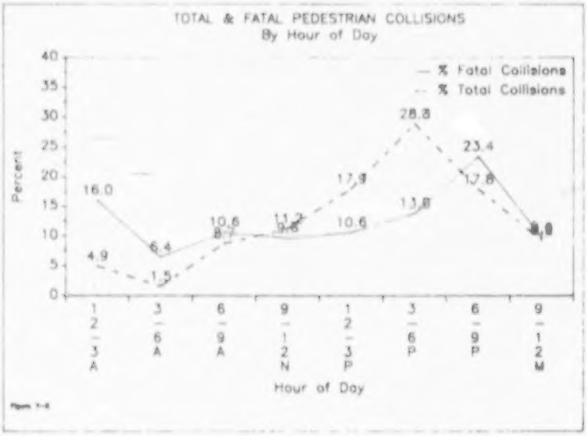


Figure 7-2



VII. Heavy Trucks

In 1988, 6,149 heavy trucks were involved in collisions, for an 18.8% decrease over the four-year baseline. Registrations in 1988 totaled an estimated 172,000 vehicles, a 7.8% increase over the four-year average. Based on this registration figure, the 1988 collision rate was 357.5 collisions per 10,000 registered trucks, a decrease of 25.1% from the four-year average.

There were 79 heavy trucks involved in fatal collisions during 1988. This was a 2.3% increase compared to the baseline average. While the fatal collision rate was up slightly from the previous year, it was down 5.8% from the previous four-year average rate of 4.9 deaths per 10,000 registered trucks (Table 8-1).

Table 8-1

SUMMARY OF HEAVY TRUCKS
Heavy Trucks Involved in Traffic Collisions

Collision Severity/Exposure & Rates	Years 1988	1987	1986	1985	1984	Previous 4 Year Average	% of Change 88 - 4 Year Average
Total Trucks Involved in Collisions	6,149	6,243	7,983	8,605	7,472	7,576	-18.8%
Trucks Involved in Fatal Collisions	79	71	66	85	87	77	2.3%
Registration of Heavy Trucks*	172,000	168,600	164,000	155,000	150,661	159,565	7.8%
Total Collision Rate**	357.5	370.3	486.8	555.2	495.9	477.0	-25.1%
Fatal Collision Rate**	4.6	4.2	4.0	5.5	5.8	4.9	-5.8%

* Estimated
**Collisions per 10,000 registered trucks

A. Age of Drivers Involved in Heavy Truck Collisions

The 39-year-old and younger drivers were over-represented in heavy truck collisions compared to the percentage of licensed drivers each group composed. The 19 and under group composed 0.2% of all licensed heavy truck operators. Yet this group was involved in 1.8% of all heavy truck collisions, 1.3% of the heavy truck fatal crashes and 2.4% of the heavy truck injury collisions. The ratio for percent of collision involvement compared to percent of licensed drivers composed by the 19 and under age group resulted in an over-representation ratio of 9.05 for this group. The 20-29 year old age group was involved in 26.2% of the total collisions, 20.2% of the fatal collision and 27.2% of the injury collisions. This group composed 14.2% of all drivers having a classified endorsement on their licenses. Based on the percentage of licensed drivers and collision involvement, this group was over-represented in collisions by a ratio of 1.84. The 30-39 year old age group was involved in 32.2% of the total reported collisions and made up 29.7% of the drivers having a classified endorsement on their license. The representation for this group was nearly equal. The rest of the driver age groups were under-represented in total collisions (Table 8-2).

Table 8-2

DRIVERS INVOLVED IN HEAVY TRUCK COLLISIONS
By Age

Age	All Collisions Number	All Collisions %	Fatal Collisions Number	Fatal Collisions %	Injury Collisions Number	Injury Collisions %	% of Classified Drivers*	Over/Under Ratio**
19 & Under	99	1.8%	1	1.3%	45	2.4%	0.2%	9.05
20-29	1,419	26.2%	15	20.0%	504	27.2%	14.2%	1.84
30-39	1,746	32.2%	28	37.3%	595	32.1%	29.7%	1.08
40-49	1,239	22.9%	22	29.3%	418	22.6%	26.2%	0.87
50-59	674	12.4%	5	6.7%	202	10.9%	16.7%	0.75
60 & Over	244	4.5%	4	5.3%	88	4.8%	13.0%	0.35

* Classified Endorsement is only required for operators of the larger trucks and truck combinations
** Percent of collision involvement to percent of licensed drivers

B. Heavy Truck Defects

Defective brakes accounted for 40.4% of the defects detected in heavy trucks involved in collisions in 1988. Other defects included 12.7% worn or smooth tires, 6.3% defective rear lights, 5.5% defective steering, and 35.1% other defects (Table 8-3).

Table 8-3

DEFECTS OF HEAVY TRUCKS INVOLVED IN COLLISIONS
Four-Year Comparison

	1988		1987		1986		1985	
Condition of Vehicle	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Defective Brakes	236	40.4%	254	39.6%	329	42.1%	325	41.1%
Defective Headlights	6	1.0%	6	0.9%	4	0.5%	7	0.9%
Defective Rear Lights	37	6.3%	27	4.2%	48	6.1%	49	6.2%
Defective Steering Mechanism	32	5.5%	30	4.7%	33	4.2%	37	4.7%
Puncture or Blowout	24	4.1%	23	3.6%	21	2.7%	29	3.7%
Worn or Smooth Tires	74	12.7%	79	12.3%	87	11.1%	101	12.8%
Other Defects	175	30.0%	222	34.6%	259	33.2%	243	30.7%

C. Location of Heavy Truck Collisions By Severity

In 1988, 53.5% of the heavy trucks involved in total collisions were in urban areas (Figure 8-1). There were 15 heavy trucks involved in fatal collisions in urban areas, compared to 64 in the rural areas. These figures compose a 19.0% to 81.0% urban/rural proportion of involvement in fatal collisions (Figure 8-2). The 1988 heavy truck involvement in injury collisions was split, 939 urban to 1,027 rural. These figures are 47.8% to 52.2% urban/rural split (Figure 8-3).

Figure 8-1

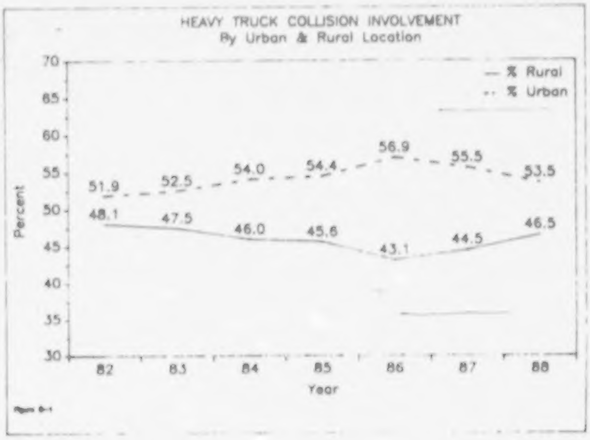


Figure 8-2

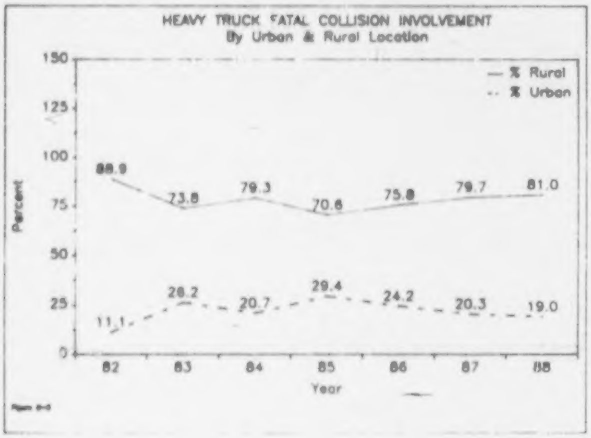
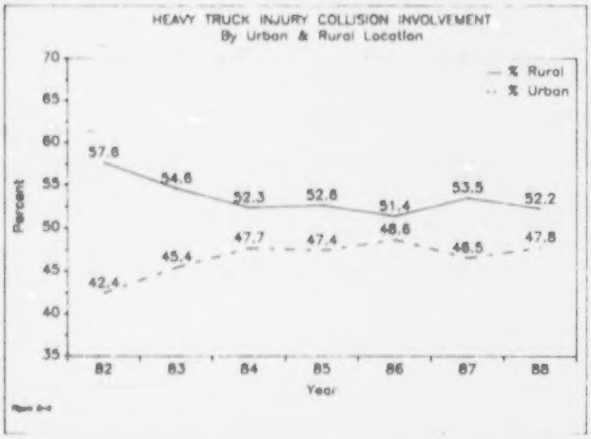


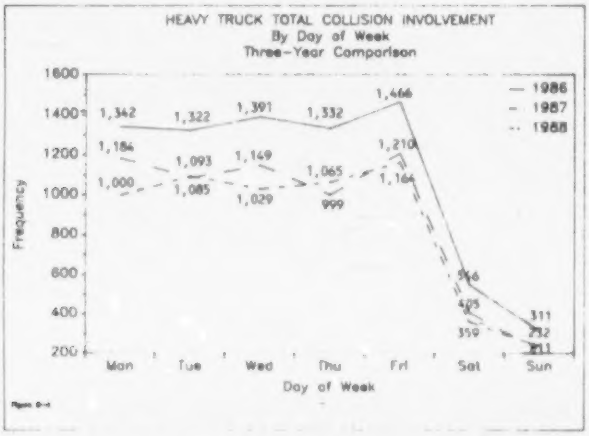
Figure 8-3



D. Heavy Truck Collision Occurrences By Time

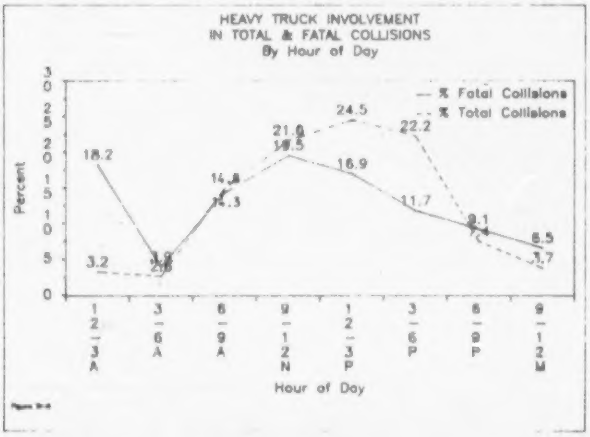
The weekdays showed the highest frequency of heavy truck collision involvement, and Friday recorded the single day high. During the weekend, as expected, there was a substantial decline in the frequency of heavy truck involvement in collisions (Figure 8-4).

Figure 8-4



Last year, the time period from noon to 3 p.m. recorded the highest incidence of heavy truck involvement in collisions. A substantial increase in collisions began during the 6 a.m. to 9 a.m. time period, peaked at the noon to 3 p.m. period, remained high during the 3 p.m. to 6 p.m. period, and then sharply declined (Figure 8-5).

Figure 8-5



E. Total Collisions - Light Trucks vs. Heavy Trucks

There were 56,405 light trucks and 6,149 heavy trucks involved in collisions in 1988. This 90.2% to 9.8% ratio between light and heavy trucks continues a trend for an increase in light truck collision ratio started in 1984 (Figure 8-6).

F. Collisions By First Harmful Event

Heavy trucks were involved in 4,388 collisions involving other moving motor vehicles. This figure represents 73.8% of all heavy truck collisions for 1988. Heavy trucks also were involved in 353 collisions in which the other vehicle was parked and in 677 collisions with fixed or other objects. Overturning, other non-collisions, and all other collisions accounted for the remaining heavy-truck involved collisions (Table 8-4).

Figure 8-6

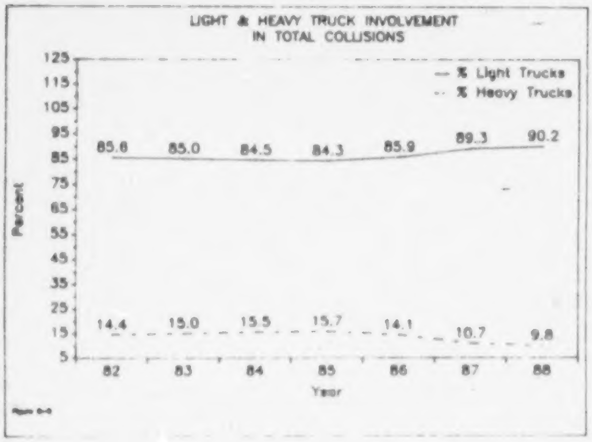


Table 8-4

HEAVY TRUCK COLLISIONS BY FIRST HARMFUL EVENT
Four-Year Comparison

	1988		1987		1986		1985	
Type of Collision	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Collision with other moving motor vehicles	4,388	73.8%	4,595	73.6%	5,686	73.7%	6,042	73.2%
Collision with parked vehicle	353	5.9%	440	7.0%	600	7.8%	643	7.8%
Collision with fixed/other object	677	11.4%	636	10.2%	792	10.3%	884	10.7%
Overturning	349	5.9%	379	6.1%	386	5.0%	414	5.0%
Other non-collision	105	1.8%	107	1.7%	116	1.5%	153	1.9%
All other collisions*	70	1.2%	86	1.4%	130	1.7%	116	1.4%

* Pedestrians, pedalcyclists, RR train & animal.

VIII. Pupil Transportation

During the 1987-88 school year, there were 311 reported school bus collisions in which 268 persons were injured and 1 pedestrian was killed. This represented a 14.6% increase over the previous three-year average in total school bus collisions, a 79.5% increase in the number of persons injured, and a decrease of 4 in the number killed. Injuries to pupils riding in the school buses totaled 116 for the 1987-88 school year; up from the 59 reported for the 1986/87 school year and from the three-year average of 45 pupils injured. There were 6,427 registered school buses in the 1987-88 school year. This marked a 4.8% decrease in registrations from the baseline period. School bus travel increased 18.98% during the 1987-88 school year compared to the previous three-year baseline period (Table 9-1).

During the 1987-88 school year, the school bus mileage collision rate was .43 collisions per 100,000 miles of travel. This rate was down from the 0.45 rate experienced in the 1986-87 school year and the previous three-year baseline (Figure 9-1).

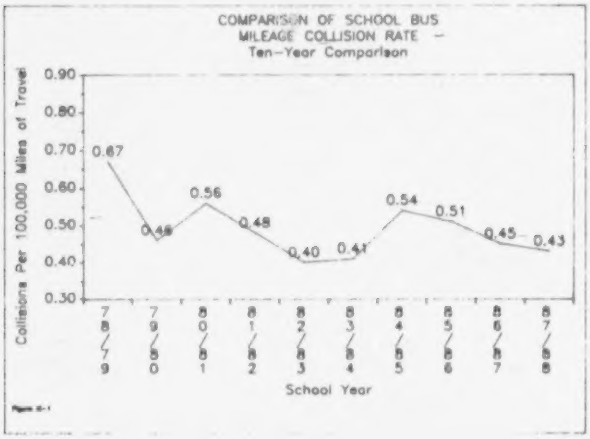
Table 9-1

COLLISIONS INVOLVING SCHOOL BUSES
Four-Year Comparison

Severity, Exposure & Rates	Years				Previous 3 Year Average	% of Change 88 - 3 Year Average
	87-88	86-87	85-86	84-85		
Total Collisions	311	310	338	310	271	14.62%
Fatal Collisions	1	5	0	2	1	-25.00%
Injury Collisions	115	92	95	91	84	37.45%
Property Damage Collisions	195	213	243	217	186	4.65%
Number Killed	1	5	0	2	1	0.00%
Persons Injured						
Pupils	116	59	29	28	45	157.78%
School Bus Drivers	28	9	19	23	15	82.61%
Other Occupants of School Bus	0	1	2	0	2	-100.00%
Pedestrian/Bicyclist	7	7	5	4	4	75.00%
Occupants/Other Vehicles Involved	117	93	92	85	83	40.40%
Total Injured	268	169	167	140	149	79.46%
School Bus Registration	6,427	6,185	6,121	6,107	6,133	4.80%
Registration Collision Rate*	48.4	50.1	55.2	50.8	44.3	9.33%
Miles Traveled (in thousands)	72,816.2	68,658.8	66,586.6	57,849.3	61,201.7	18.98%
Mileage Collision Rate**	0.43	0.45	0.51	0.54	0.446	-4.22%

* Collisions per 1,000 registered vehicles
** Collisions per 100,000 miles traveled

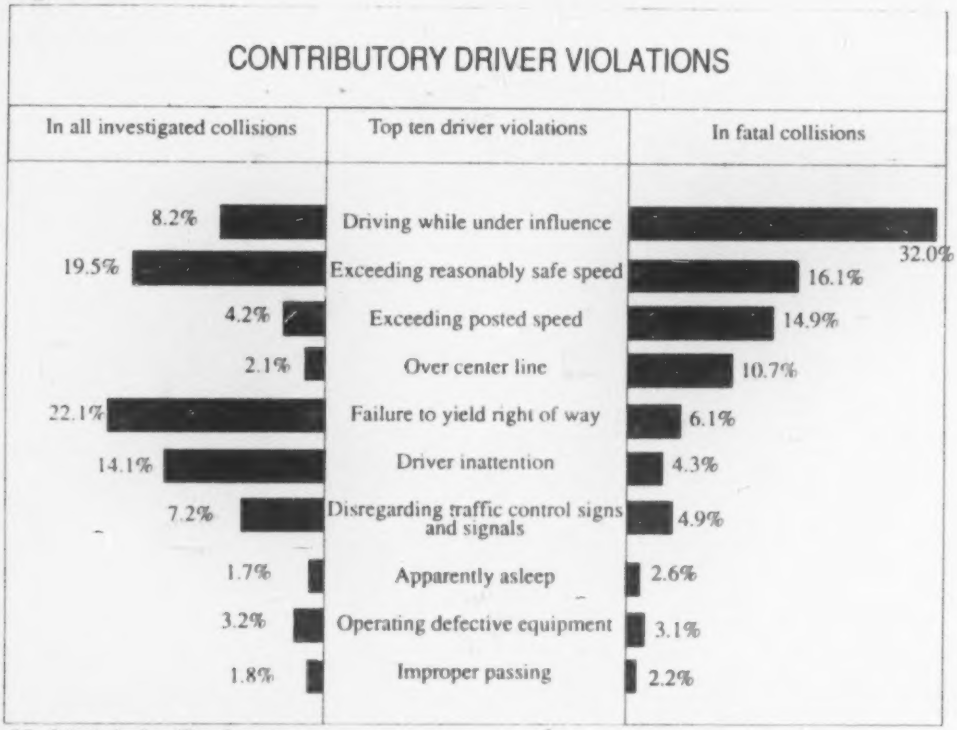
Figure 9-1



XI. Contributory Driver Violations

Driving while under the influence of intoxicating liquor contributed to 32.0% of the driver violations in fatal collisions and 8.2% of all investigated collisions. Failure to yield right of way contributed to 22.1% of all investigated collisions and 5.9% of the violations in fatal collisions (Figure 10-1).

Figure 10-1



X. Vehicle Defects

In investigated collisions during 1988, only 4.4% of the collision involved vehicles were found to have contributory vehicle defects. The most common defect was worn or smooth tires, a defect found in 3,019 vehicles. This represented an 10.7% decrease in this category compared to the previous four-year average. Defective brakes, the second most contributory defect, was found on 1,859 collision-involved vehicles in 1988. This was an increase of 2.3% compared to the baseline (Table 10-1).

Table 10-1

VEHICLE CONDITION*
Five-Year Comparison

Description	Years					Previous 4 Year Average	% of Change 88 - 4 Year Average
	1988	1987	1986	1985	1984		
Defective Tires:							
Worn or Smooth Tires	2,577	2,806	3,129	3,043	2,996	2,994	-13.9%
Puncture or Blowout	442	469	343	345	367	381	16.0%
Defective Brakes	1,859	1,961	2,026	1,723	1,785	1,874	-0.8%
Defective Lights:							
Headlights	156	144	167	156	143	153	2.3%
Rear Lights	423	331	373	370	394	367	15.3%
Other Lights/Reflectors	106	116	112	97	122	112	-5.1%
Defective Steering	306	339	287	307	381	329	-6.8%
All Other Defects	1,683	2,082	2,026	1,963	1,439	1,878	-10.4%
No Defects	164,102	161,595	156,360	147,591	139,320	151,217	8.5%
TOTAL VEHICLES INVOLVED	171,654	169,843	164,823	155,595	146,947	159,302	7.8%

* Investigated Collisions

XI. Senior Driver Involvement

Last year 26,584 senior drivers, 55 years old and older, were involved in 24,540 reported collisions in 1988. There were 137 fatal collisions involving 148 senior drivers and 9,385 injury collisions involving 10,197 senior drivers. This was a 5.4% increase of seniors involved in reported collisions, a 0.3% increase of the number involved in fatal crashes, and a 9.3% increase of those involved in injury collisions compared to the previous four-year baseline period. License registrations of senior drivers also increased 6.9% from the baseline average to 763,079. The fatal collision rate (total collisions per 1,000 licensed drivers) of 0.19 for 1988 was down 5.7% from the baseline period (Table 11-1).

Table 11-1

SENIOR DRIVERS (55 YEARS & OLDER) INVOLVED IN COLLISIONS+
Five-Year Comparison

Collisions & Rates	Years					Previous 4 Year Average	% of Change 88 - 4 Year Average
	1988	1987	1986	1985	1984		
Senior drivers involved in							
Total Collisions	26,584	26,482	25,842	24,978	23,630	25,233	5.4%
Fatal Collisions	148	157	140	144	149	148	0.3%
Injury Collisions	10,197	9,634	9,560	9,264	8,855	9,328	9.3%
Licensed Drivers	763,079	741,653	719,784	706,719	686,985	713,785	6.9%
Fatal Collision Ratio*	5.57	5.93	5.42	5.77	6.31	5.85	-4.9%
Fatal Rate**	0.19	0.21	0.19	0.20	0.22	0.21	-5.7%
Total Collision Rate***	3.48	3.57	3.59	3.53	3.44	3.53	-1.4%

+ The number of senior drivers involved
* Fatal Collisions per 1,000 total collisions
** Fatal Collisions per 1,000 licensed drivers
*** Senior drivers involved per 100 licensed

A. Senior Driver Collisions By First Harmful Event

In 1988, 87.7% of the collisions involving senior drivers were "collisions with other moving vehicles." This type of collision also resulted in the greatest percentage of fatal collisions (59.9%) and injury collisions (85.3%). Single-vehicle collisions with fixed objects led to the second largest percentage of senior drivers involvement in total, fatal and injury collisions at 5.6%, 18.2% and 6.4% respectively. While collisions with pedestrians and bicycles comprised only 1.8% of the total senior driver collisions, 15.3% of the fatal crashes, and 4.4% of the senior's injury collisions (Table 11-2).

Table 11-2

COLLISIONS INVOLVING SENIOR DRIVERS*
By First Harmful Event

Type of Collision	Total Collisions		Fatal Collisions		Injury Collisions	
	Number	% of Total	Number	% of Total	Number	% of Total
Collision with other moving motor vehicles	21,520	87.7%	82	59.9%	8,008	85.3%
Collision with parked vehicle	579	2.4%	0	0.0%	125	1.3%
Collision with fixed/other object	1,383	5.6%	25	18.2%	605	6.4%
Overturning & other non collision	370	1.5%	8	5.8%	191	2.0%
Collisions with pedestrian & bicycles	443	1.8%	21	15.3%	417	4.4%
Other collisions including RR train, animal	265	1.0%	1	0.7%	39	0.4%
TOTAL	24,540	100.0%	137	100.0%	9,385	100.0%

* Collisions in which one or more senior drivers involved

B. Senior Driver Collision Involvement By Age Group

Failure to yield right-of-way contributed to 49.4% of the total drivers violations for drivers 75 years and older. This violation was also the leading violation for all drivers 55 years and older. This was followed by disregarding traffic control signs and signals for drivers 70 and over. Speed too fast for conditions was the second leading contributing cause for drivers 55-59, 60-64, and 65-69 years old (Table 11-3).

Table 11-3

55 YEARS & OLDER INVOLVEMENT IN TOTAL COLLISIONS
Percent of Total Circumstances by Age Group

	55-59		60-64		65-69		70-74		75 & Older	
Contributing Circumstances*	Number	%	Number	%	Number	%	Number	%	Number	%
Failure to Yield Right of Way	877	31.0%	923	36.0%	879	37.9%	911	44.3%	1,494	49.4%
Speed--Too Fast For Conditions	446	15.8%	336	13.1%	249	10.7%	186	9.1%	209	6.9%
Disregarding Traffic Signal/Signs	237	8.4%	228	8.9%	228	9.8%	229	11.1%	344	11.4%
Following Too Closely	290	10.3%	251	9.8%	208	9.0%	166	8.1%	189	6.3%
Driving While Under the Influence	198	7.0%	150	5.9%	104	4.5%	59	2.9%	33	1.1%
Operating Defective Equipment	70	2.5%	52	2.0%	49	2.1%	36	1.8%	38	1.3%
Crossing Over the Centerline	44	1.6%	36	1.4%	29	1.3%	26	1.3%	38	1.3%
Exceeding Legal Speed	33	1.2%	19	0.7%	11	0.5%	14	0.7%	24	0.8%
All Other Circumstances including Driver Inattention	633	22.4%	568	22.2%	560	24.2%	428	20.8%	655	21.7%
TOTAL	2,828	100.0%	2,563	100.0%	2,317	100.0%	2,055	100.0%	3,024	100.0%

*Investigated collisions only

In 1988, the 55-59 year old group was involved in 6,805 reported collisions for 3.47% of all collisions. This group made up 5.40% of the total number of drivers licensed to drive in this state. The under-representation ratio of 0.64 was the same as reported for the previous year and the previous four-year baseline average (Figure 11-1). The 60-64 age group post an under-representation ratio of 0.58, up slightly from the previous four-year baseline average (Figure 11-2). The 65-69 year old group recorded a 0.53 under-representation ratio, the same as the previous four-year average (Figure 11-3). The 70-74 age group recorded a 0.53 under-representation ratio, down from .55 baseline average (Figure 11-4). The last group is the 75 years old and older group. This group had a .60 under-representation, down from the baseline ratio of .63 (Figure 11-5).

Figure 11-1

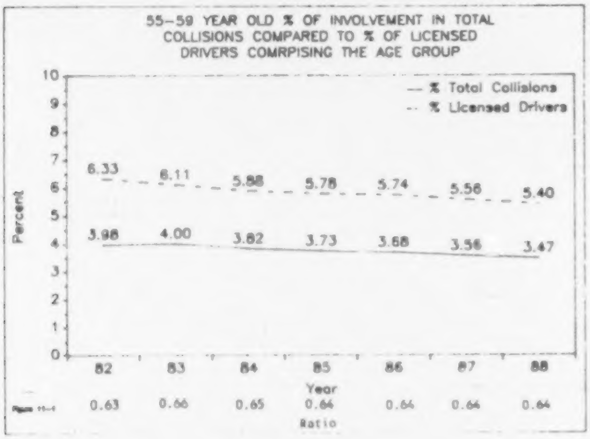


Figure 11-2

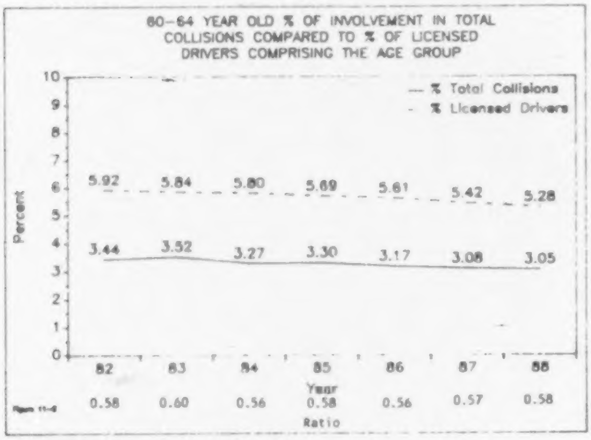


Figure 11-3

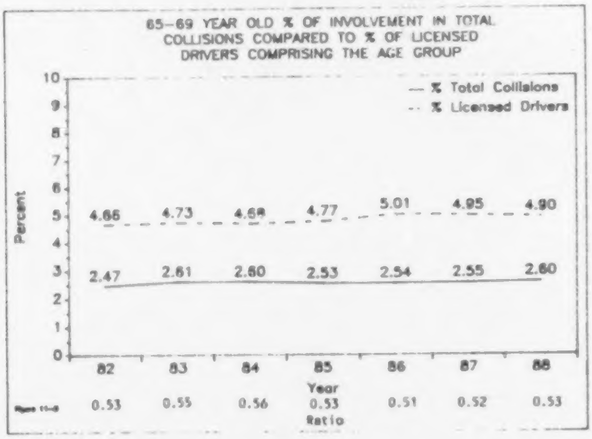


Figure 11-4

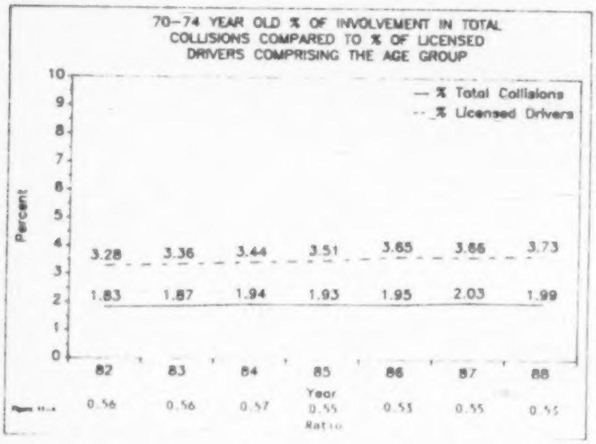
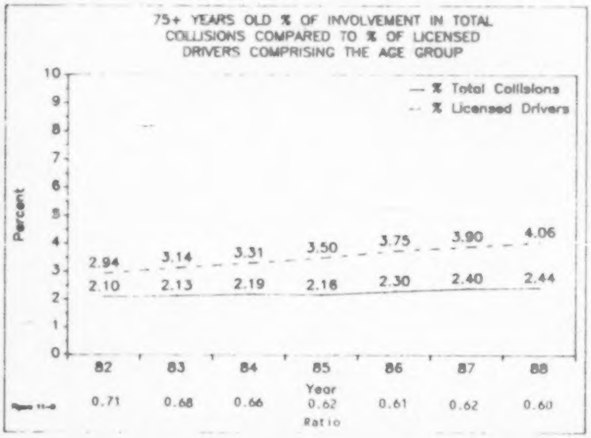


Figure 11-5



The urban/rural collision ratio involving senior drivers (55 years old and older) remained relatively constant during the past seven years with a 65.2 to 34.8 urban/rural mix for 1988. The senior driver injury collision urban/rural mix has also remained fairly constant during the past seven years. Senior driver fatal collisions continued to be more common in rural areas. In 1988, 66.9% or two-thirds of the fatal collisions involving senior drivers occurred in rural areas (Figure 11-8).

Figure 11-6

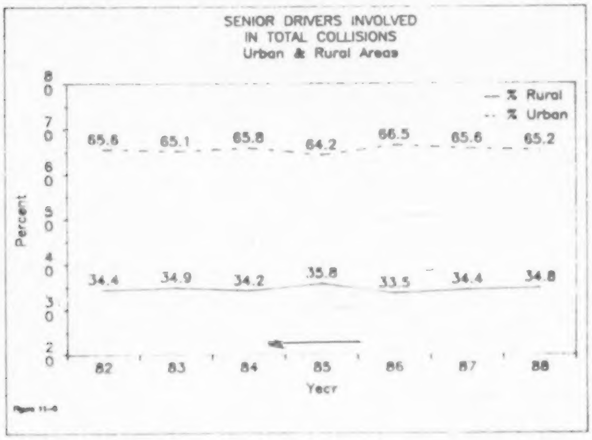


Figure 11-7

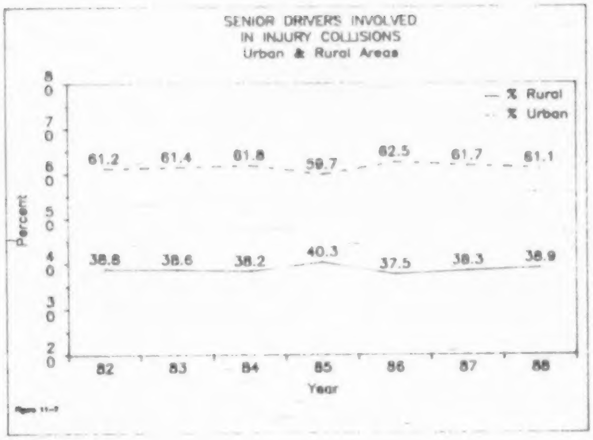
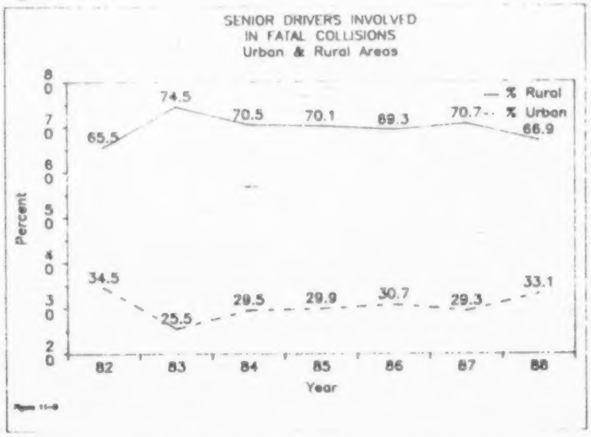


Figure 11-8



C. Senior Driver Involvement By Time

Last year, 18.0% of all rural fatal collisions involving senior drivers occurred on Monday, 17.6% occurred on Saturday, and 15.4% occurred on Tuesday. Friday was the high day of the week for total reported rural collisions, accounting for 17.0% of the senior driver collisions. Thursday followed with 15.6% and Tuesday with 14.9% of the collisions (Figure 11-9). Friday and Saturday were the two highest fatal collision days, each recording 19.6% of the senior drivers urban area collisions. Friday recorded the greatest percentage of urban total reported collisions, 19.5%, for the group (Figure 11-10).

Figure 11-9

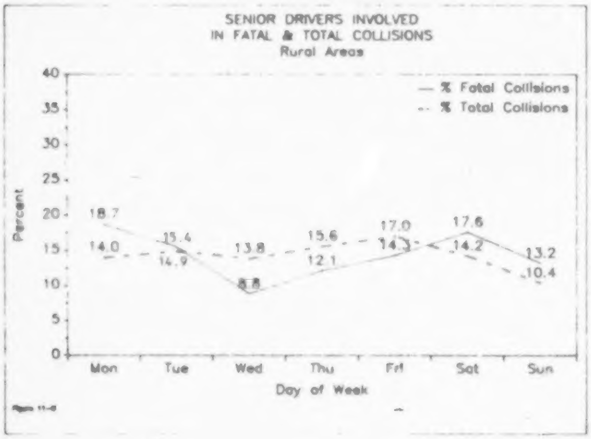
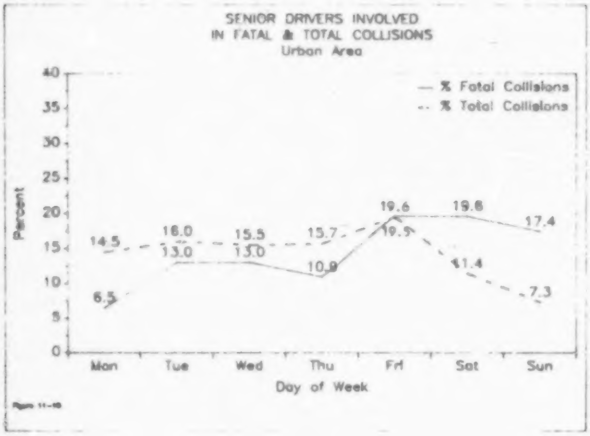


Figure 11-10



In rural areas, the greatest percentage (28.6%) of senior driver involvement in fatal crashes occurred from 3 p.m. to 6 p.m.. The greatest percentage of total collision involvement (29.2%) for these drivers also occurred from 3 p.m. to 6 p.m. (Figure 11-11). In the urban areas, the greatest senior involvement was from 3 p.m. to 6 p.m. for fatal collisions at 30.6%. This same time frame recorded 30.0% of the total urban reported collisions of the senior drivers (Figure 11-12).

Figure 11-11

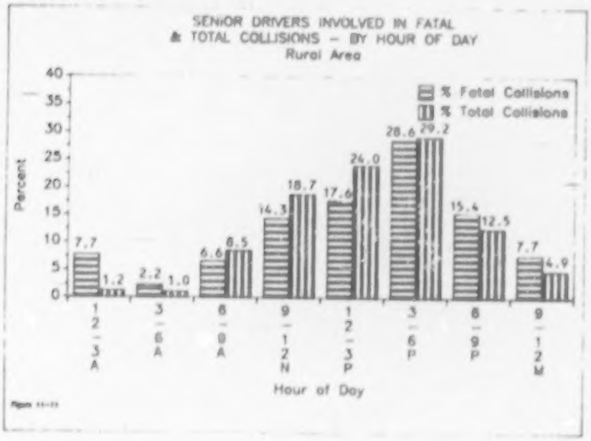
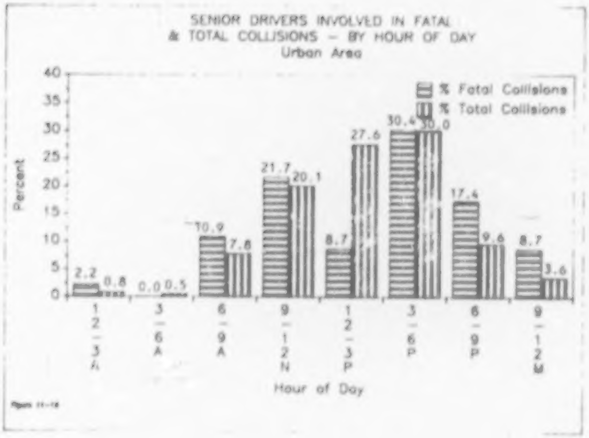


Figure 11-12



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Data Summary and Problem Analysis

1989 Traffic Collisions in Washington State

June, 1990

Washington Traffic Safety Commission
1000 South Cherry Street, MS/PD-11, Olympia, WA 98504

Data Summary and Problem Analysis

Introduction 1

I. Overview 3
II. Alcohol Involvement 17
III. Youth Involvement 32
IV. Safety Restraint Use 40
V. Motorcycle Collisions 49
VI. Pedalcycles 56
VII. Pedestrians 60
VIII. Heavy Trucks 65
IX. Pupil Transportation 71
X. Contributory Driver Violations 73
XI. Senior Driver Involvement 74
VII. Vehicle Defects 82

Introduction

This edition of the Data Summary and Problem Analysis documents and analyzes traffic impact problems that occurred during 1989 within the State of Washington. An abbreviated version of this document is used for the Problem Analysis section of the Traffic Safety Commission's 1991-1992 Highway Safety Plan.

Impact problems consist of factors that contribute directly to the occurrence of collisions, fatalities, and/or injuries. They are identified and analyzed to make possible the design and implementation of countermeasures against their negative effects.

Problem areas were selected based on statewide experience of impact areas (where information was available) as outlined in the federal safety standards. Various statewide automated and manual traffic information systems were inventoried and analyzed. The data sources included: Traffic Accident Records, Fatal Accident Reporting System, Driver's Licensing Records, Vehicle Registration Records, and Highway/Roadway Information. In most instances, data from previous years were gathered as a baseline to serve as a point of comparison to the current year.

Statewide traffic collision records were the primary source for identifying the specific traffic problem areas. Collision experience from prior years served as a baseline in analyzing the traffic collision data. This baseline provided a perspective to assess the current year's (1989) experience with traffic problem areas. The baseline also serves to identify short-term changes in collision patterns as distince from longer-term trends.

The development of over/under-representation ratios was the primary method of analysis. Where relevant exposure data were available, the generation of over-representation ratios allow for the comparisons of different subgroups relative to the percentage of the population they comprise. Additionally, counties and cities were ranked by different problem areas to compare geographical and political subdivisions.

Traffic Problems Selected for Analysis

An overview plus the following traffic safety problem areas were selected for this year's analysis:

- Alcohol Involvement
- Youth Involvement
- Safety-Restraint Usage
- Motorcycle Collisions
- Pedalcycles
- Pedestrians
- Heavy Trucks
- Pupil Transportation
- Contributory Driver Violations
- Senior Driver Involvement
- Vehicle Defects

I. Overview

The number of persons killed on Washington's highways in 1989 totaled 781, a 2.4% increase from the 1986-1988 three-year baseline average of 763. The total number of fatal collisions increased 0.9% in 1989 compared to the average for 1986-1988. Injury collisions and total number of persons injured also increased in 1989 by 6.8% and 7.3% respectively over the three-year averages in those categories. Property-damage-only collisions showed very little change over the previous three years (Table 1-1).

Table 1-1

SEVERITY OF COLLISIONS
Four-Year Comparison

Impact	Year 1989	Year 1988	Year 1987	Year 1986	Previous 3-Year Average	% of Change 89 - 3-Year Average
Total Collisions	128,800	125,920	126,807	122,918	125,215	2.9%
Fatal Collisions	694	706	699	658	688	0.9%
Total Killed	781	785	790	714	763	2.4%
Injury Collisions	50,747	49,482	46,968	46,090	47,513	6.8%
Total Injured	73,993	72,449	67,665	66,707	68,940	7.3%
Property Damage Only Collisions*	77,359	75,732	79,140	76,170	77,014	0.4%

* Oct. 1, 1987 the reporting level for motor vehicle traffic collisions increased from $300 to $500. Fatal and injury collisions were not affected by this change in the law, but property damage only collisions were reduced by 4.3% in 1988.

Source: WSP

A. Exposure

Motor vehicle travel increased by 11.8% in 1989 as compared to the 1986-1988 baseline average. Motor vehicle registration also jumped 7.7% over the baseline while the number of licensed drivers increased 6.4%. In 1989, the state's population increased 3.8% over the 1986-1988 average to a total of 4,660,700 persons (Table 1-2).

Table 1-2

VEHICLES AND DRIVERS
Four-Year Comparison

Exposure	Year 1989	Year 1988	Year 1987	Year 1986	Previous 3 - Year Average	% of Change 89 - 3-Year Average
Motor Vehicle Travel*	43,449	41,698	38,520	36,416	38,878	11.8%
Motor Vehicle Registration	4,084,367	3,896,828	3,833,058	3,651,102	3,793,663	7.7%
Licensed Drivers	3,350,324	3,264,065	3,156,600	3,029,375	3,150,013	6.4%
State's Population	4,660,700	4,565,000	4,481,100	4,419,700	4,488,600	3.8%

*in Millions

Source: WSDOT, DOL, OFM

B. Rates

The 1989 motor vehicle traffic death rate was 1.80 fatalities per 100 million vehicle miles - the lowest in the state's history. The rate was down 8.5% from the previous three-year average and lower than the 1988 rate of 1.88, the previous record low. The rate of 1.70 injuries per one million vehicle miles in 1989 was also down from the 1.74 rate for 1988 (Table 1-3).

Table 1-3

Source WSP, WSDOT

DEATH AND INJURY RATES
Four-Year Comparison

Rates	Year 1989	Year 1988	Year 1987	Year 1986	Previous 3-Year Average	% of Change 89 - 3-Year Average
Death Rate (Deaths per 100M vehicle miles)	1.80	1.88	2.05	1.96	1.96	-8.5%
Injury Rate (Injuries per 1M vehicle miles)	1.70	1.74	1.76	1.83	1.78	-4.1%

C. Fatalities by Status

Drivers were killed more frequently than passengers or others in 1989 motor vehicle collisions. Fatalities in this classification increased from 394 in 1988 to 420 in 1989. The 1989 figure represented an 11.2% increase from the average of the three previous years. The number of passengers killed, however, decreased from 206 to 174, representing a 15.5% reduction from 1988, and down 53, or 10.8%, from the three-year baseline period. The number of motorcyclists killed in collisions decreased to 69 in 1989 (Table 1-4).

Table 1-4

PERSONS KILLED BY STATUS
Four-Year Comparison

Status	Year 1989	Year 1988	Year 1987	Year 1986	Previous 3-Year Average	% of Change 89 - 3-Year Average
Drivers (no motorcyclists)	420	394	386	353	378	11.2%
Passengers	174	206	204	175	195	-10.8%
Pedestrians	110	97	93	94	95	16.2%
Pedalcyclists	8	12	18	12	14	-42.9%
Motorcyclists	69	76	89	80	82	-15.5%
TOTAL	781	785	790	714	763	2.4%

Source: Washington State Patrol

D. Traffic Collisions, Deaths, Injuries, Travel, and Death Rate

After a sharp increase in traffic deaths during 1987, there were slight decreases the following two years with 785 in 1988 and 781 in 1989. Figure 1-1 indicates that total traffic deaths have leveled off during the past three years. The two extremes in recent history of traffic deaths are a high of 1,034 deaths recorded in 1979 and a record low of 705 in 1983. Motor vehicle travel in 1989 increased by 4.2% over 1988 to reach an all-time high of 43.449 billion miles (Figure 1-2).

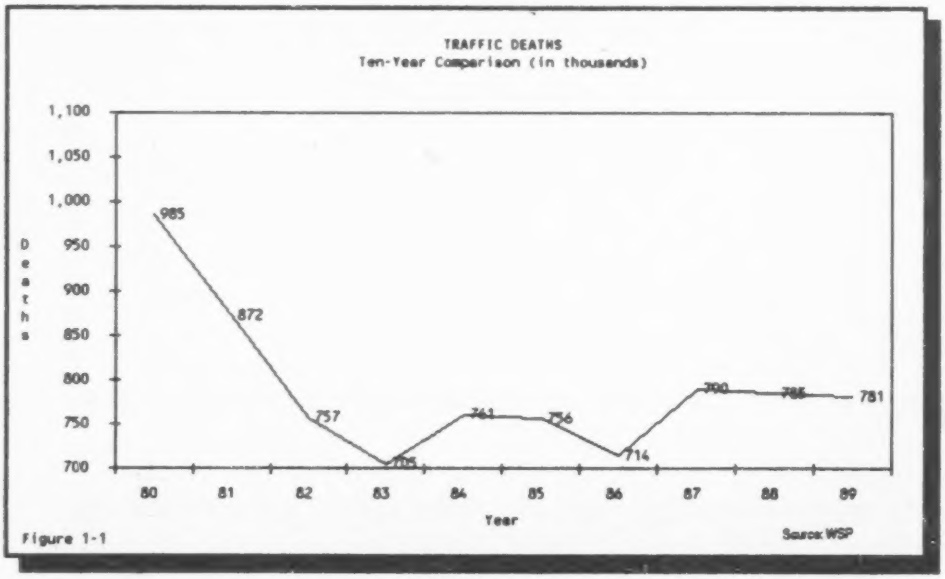
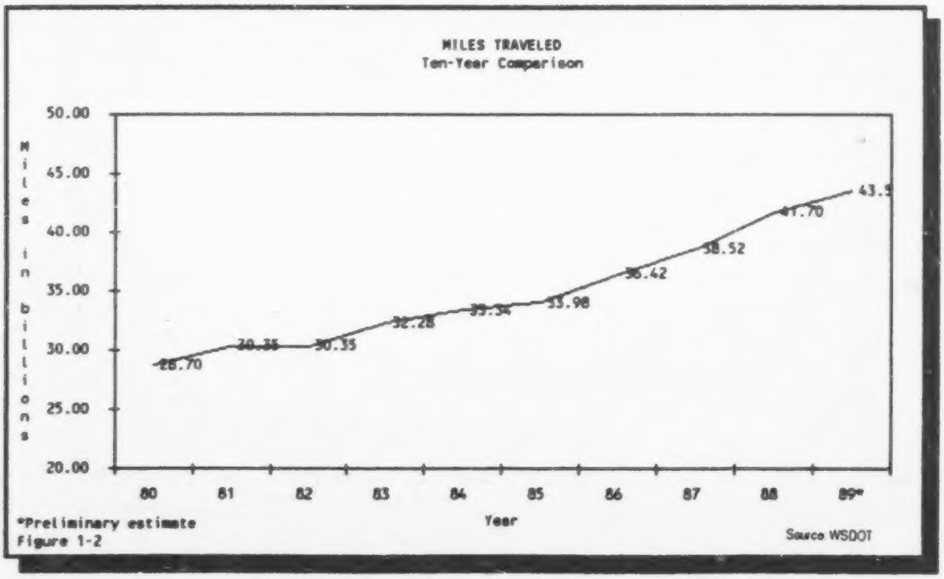


Figure 1-1

Source: WSP

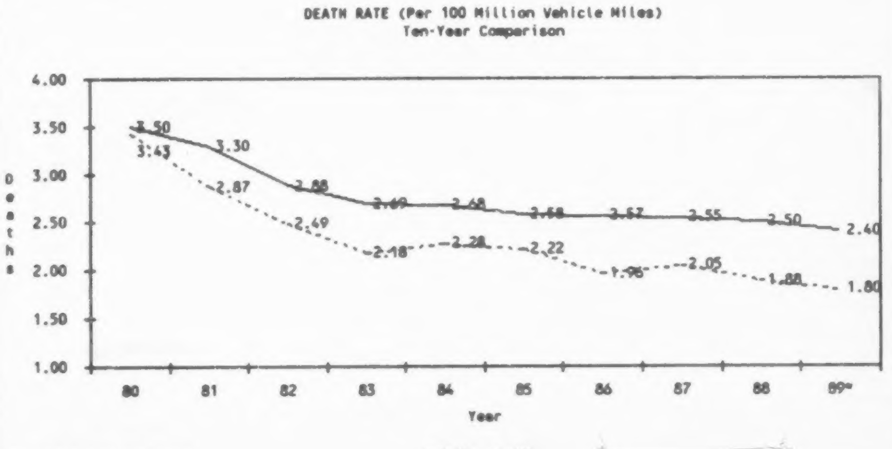


*Preliminary estimate

Figure 1-2

Source WSDOT

The state's 1989 traffic fatality rate of 1.80 deaths per 100 million vehicle miles of travel continues to be well below the national rate of 2.40 for the year. The 1.80 rate is the lowest point in Washington's history: it fell from the 1.88 rate recorded in 1988 and was 47.5% below the 3.43 rate recorded at the beginning of the decade (Figure 1-3).



*Preliminary estimate
Figure 1-3

Source: WSP, National Safety Council

Total reported motor vehicle traffic collisions and injuries increased over the three-year average. Compared to 1988, total collisions and the number of persons injured were up by 2.3% and 2.1% respectively (Figure 1-4).

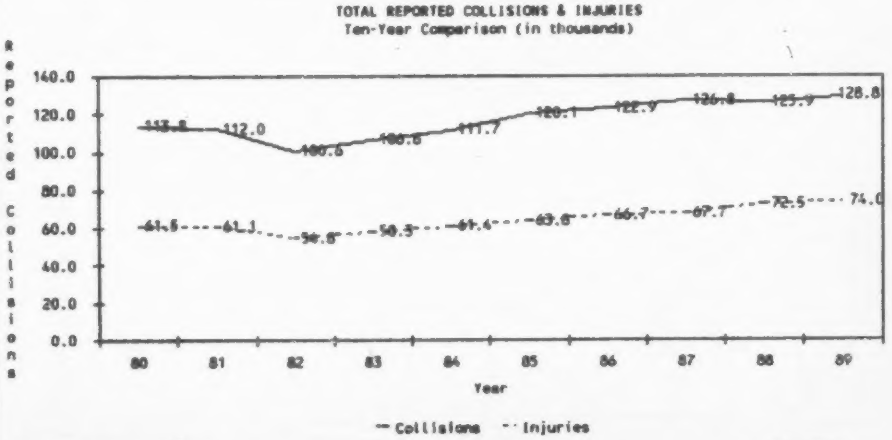


Figure 1-4

Source: WSP

E. Highways, Travel and Fatalities

The U.S. and state numbered systems (other than the interstate system) were the most-traveled road systems in the state with an estimated 12.231 billion miles traveled. The interstate system continued to have the lowest death rate of all the state systems with a 0.80 rate per 100 million vehicle miles in 1989: a decrease of 0.18 from 1988. Estimated travel on city streets totaled 8.116 billion miles in 1989 with a death rate of 1.18, up very slightly from 1988. County roads were traveled an estimated 10.852 billion miles and recorded a death rate of 2.56 in 1989, a decrease from the previous year's 2.85 rate. Total motor vehicle travel in the state increased from 41.698 billion miles in 1988 to 43.449 billion in 1989 (Table 1-5).

Table 1-5

HIGHWAYS, TRAVEL, AND COLLISIONS
By Type of Highway

Type of Highways	Highways		Vehicle Miles Traveled+		Collisions		
	Miles	% of Total	Miles (Millions)	% of Total	Total Collisions	Total Fatalities	Death Rate for CMVM*
Interstate System**	771	0.9%	10,539	24.3%	13,575	84	0.80
All Other State Highways	6,225	7.6%	12,231	28.2%	29,494	316	2.58
County Roads	41,748	51.2%	10,852	25.0%	28,505	278	2.56
City Streets	11,382	14.0%	8,116	18.7%	56,233	96	1.18
All Other Traffic Ways***	21,433	26.3%	1,711	3.9%	993	7	0.41
TOTAL	81,559	100.0%	43,449	100.0%	128,800	781	1.80

+Preliminary Estimates
*Fatalities per hundred million vehicle miles, based on roadway travel as
**Does not include traveled way.
***Does not include (all terrain vehicle) trails.

Source WSP, WSDOT

Table 1-6

Source: WSP

PERSONS KILLED AND INJURED
By Age and By Status

	Total		Occupants		Pedestrians		Pedalcyclists	
Age	Killed	Injured	Killed	Injured	Killed	Injured	Killed	Injured
0 - 4	13	1,327	8	1,229	5	83	0	14
5 - 9	16	2,022	7	1,556	6	235	3	230
10 - 14	21	2,290	14	1,708	5	226	2	354
15 - 19	96	11,586	82	11,148	13	218	1	215
20 - 24	113	11,293	103	10,975	10	185	0	130
25 - 34	200	17,412	179	16,932	19	288	1	185
35 - 44	104	11,674	93	11,377	11	219	0	69
45 - 54	56	6,125	45	5,996	10	95	1	30
55 - 64	48	3,657	40	3,554	8	87	0	14
65 - 74	49	2,512	44	2,426	5	78	0	7
75/Older	60	1,453	42	1,376	18	74	0	3
Not Stated	5	2,641	5	2,514	0	70	0	51
TOTAL*	781	73,992	662	70,791	110	1,858	8	1,302

*Total killed includes 1 fatality where the status of the killed was unknown.
Total injured includes 41 injured where the status of the injured was unknown.

Table 1-7

Source: WSP

COMPARISON OF TRAFFIC DEATHS BY MONTH
Three-Year Comparison

Month	1989		1988		1987		% Change 88 to 89	
	Month Total	Year To Date	Month Total	Year To Date	Month Total	Year To Date	Month Total	Year To Date
January	42	42	40	40	54	54	5.0%	5.0%
February	33	75	42	82	52	106	-21.4%	-8.5%
March	53	128	70	152	62	168	-24.3%	-15.8%
April	52	180	55	207	55	223	-5.5%	-13.0%
May	74	254	69	276	50	273	7.2%	-8.0%
June	65	319	82	358	77	350	-20.7%	-10.9%
July	76	395	86	444	73	423	-11.6%	-11.0%
August	72	467	79	523	84	507	-8.9%	-10.7%
September	85	552	70	593	90	597	21.4%	-6.9%
October	81	633	66	659	69	666	22.7%	-3.9%
November	71	704	66	725	73	739	7.6%	-2.9%
December	77	781	60	785	51	790	28.3%	-0.5%

Table 1-8

Source: WSP

COLLISIONS
By Time

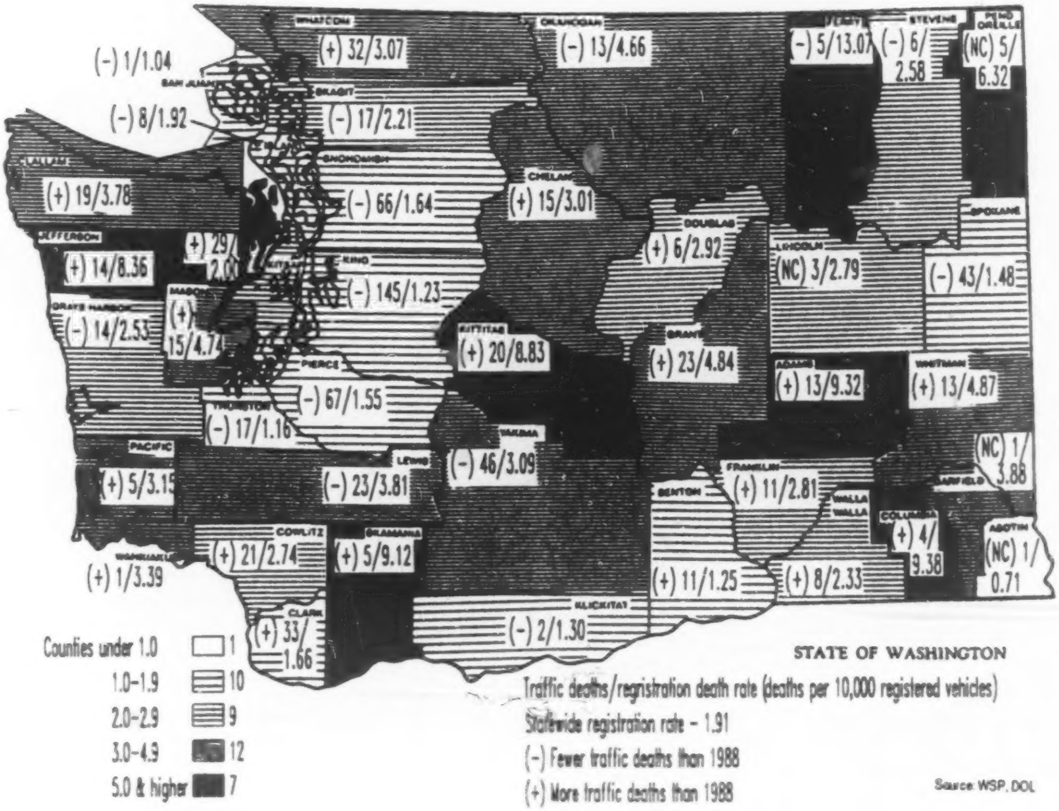
Hour Reporting	Collisions			Monday - Thursday			Friday - Sunday		
	Total	Injury	Fatal	Total	Injury	Fatal	Total	Injury	Fatal
Midnight	3,155	1,234	29	1,134	658	12	2,021	776	17
1:00	3,023	1,310	40	946	691	14	2,077	619	26
2:00	2,891	1,230	37	894	365	11	1,997	865	26
3:00	1,523	566	22	502	161	5	1,021	405	17
4:00	1,060	410	19	402	139	6	658	271	13
5:00	1,476	563	16	808	304	9	668	259	7
6:00	3,007	1,166	17	2,087	812	7	920	354	10
7:00	5,568	2,164	23	4,091	1,601	14	1,477	563	9
8:00	4,622	1,634	21	3,107	1,101	10	1,515	533	11
9:00	4,125	1,498	12	2,484	874	8	1,641	624	4
10:00	4,817	1,691	9	2,770	942	4	2,047	749	5
11:00	6,270	2,292	27	3,576	1,289	16	2,694	1,003	11
Noon	7,434	2,898	24	4,234	1,621	13	3,200	1,277	11
1:00	7,856	2,883	30	4,363	1,570	16	3,493	1,313	14
2:00	8,946	3,449	31	5,185	1,973	19	3,761	1,476	12
3:00	10,289	4,098	27	6,194	2,469	18	4,095	1,629	9
4:00	11,151	4,502	36	6,869	2,794	19	4,282	1,708	17
5:00	11,235	4,606	35	7,087	2,914	19	4,148	1,692	16
6:00	7,572	3,153	44	4,390	1,814	21	3,182	1,339	23
7:00	5,541	2,325	45	2,924	1,245	24	2,617	1,080	21
8:00	4,697	1,933	42	2,405	989	18	2,292	944	24
9:00	4,433	1,800	38	2,255	919	19	2,178	881	19
10:00	4,059	1,761	38	1,858	829	18	2,201	932	20
11:00	4,050	1,581	32	1,700	668	17	2,350	913	15
TOTAL	128,800	50,747	694	72,265	28,542	337	56,535	22,205	357

F. Traffic Deaths by County

In 1989, fatalities ranged from a high of 145 in King County, with a death rate of 1.23 (traffic deaths per 10,000 registered vehicles), to a low of 1 death in Asotin County with a death rate of 0.71. Ferry County recorded the highest death rate at 13.07 computed from 5 fatalities, followed by Columbia County that recorded a 9.38 death rate based on 4 traffic deaths. Adams County was third with 13 traffic deaths and a death rate of 9.32 (Figure 1-5).

Figure 1-5

Traffic Deaths Per 10,000 Registered Vehicles by County


WHATCOM (+) 32/3.07
OKANOGAN (-) 13/4.66
FERRY (-) 5/13.07
STEVENS (-) 6/2.58
PEND OREILLE (NC) 5/6.32
SAN JUAN (-) 1/1.04
ISLAND (-) 8/1.92
SKAGIT (-) 17/2.21
CLALLAM (+) 19/3.78
SNOHOMISH (-) 66/1.64
CHELAN (+) 15/3.01
JEFFERSON (+) 14/8.36
KITSAP (+) 29/2.00
KING (-) 145/1.23
DOUGLAS (+) 6/2.92
LINCOLN (NC) 3/2.79
SPOKANE (-) 43/1.48
GRAYS HARBOR (-) 14/2.53
MASON (+) 15/4.74
KITTITAS (+) 20/8.83
GRANT (+) 23/4.84
ADAMS (+) 13/9.32
WHITMAN (+) 13/4.87
PIERCE (-) 67/1.55
THURSTON (-) 17/1.16
YAKIMA (-) 46/3.09
PACIFIC (+) 5/3.15
LEWIS (-) 23/3.81
FRANKLIN (+) 11/2.81
GARFIELD (NC) 1/3.88
BENTON (+) 11/1.25
WALLA WALLA (+) 8/2.33
COLUMBIA (+) 4/9.38
ASOTIN (NC) 1/0.71
COWLITZ (+) 21/2.74
SKAMANIA (+) 5/9.12
WAHKIAKUM (+) 1/3.39
CLARK (+) 33/1.66
KLICKITAT (-) 2/1.30
Counties under 1.0 1
1.0-1.9 10
2.0-2.9 9
3.0-4.9 12
5.0 & higher 7
STATE OF WASHINGTON
Traffic deaths/registration death rate (deaths per 10,000 registered vehicles)
Statewide registration rate - 1.91
(-) Fewer traffic deaths than 1988
(+) More traffic deaths than 1988

Source: WSP, DOL

G. Collisions by Age Group

Drivers 20 years old and under comprised 7.4% of all licensed drivers in the state last year, yet this age group was involved in 17.4% of the total 1989 collisions. This was a collision over-representation rate 2.35 times higher than the percentage of licensed drivers comprising this group. The 21-24 age group was involved in 12.2% of the total collisions while comprising 7.5% of all licensed drivers, producing an over-representation factor of 1.63. The 25-29 age group, comprising 11.6% of all licensed drivers, was involved in 14.4% of all collisions for an over-representation ratio of 1.24. The 30-34 age group, comprising 12.7% of all licensed drivers, was involved in 12.7% of all collisions, a 1 to 1 ratio. All other age groups were under-represented when their percentages of collision involvement were compared to their percentages of total licensed drivers (Table 1-9).

Table 1-9

DRIVER DISTRIBUTION
By Age Group & Sex

	Involved in Collisions				Licensed Drivers		Over/Under Ratio	
	Total		Fatal					
Age Group	Number	%	Number	%	Number	%	Total	Fatal
Under 16	649	0.33%	3	0.29%	****	****	****	****
16	4,508	2.28%	10	0.97%	26,685	0.80%	2.87	1.22
17	6,715	3.40%	21	2.04%	41,024	1.22%	2.78	1.67
18	7,876	3.99%	38	3.69%	54,298	1.62%	2.46	2.28
19	7,659	3.88%	43	4.17%	64,230	1.92%	2.02	2.18
20	6,895	3.49%	37	3.59%	59,961	1.79%	1.95	2.01
21	6,310	3.19%	24	2.33%	60,850	1.82%	1.76	1.28
22	6,085	3.08%	30	2.91%	61,214	1.83%	1.69	1.59
23	5,870	2.97%	31	3.01%	63,702	1.90%	1.56	1.58
24	5,843	2.96%	31	3.01%	64,469	1.92%	1.54	1.56
25-29	28,505	14.43%	165	16.02%	388,902	11.61%	1.24	1.38
30-34	25,034	12.68%	137	13.30%	423,959	12.65%	1.00	1.05
35-39	21,311	10.79%	98	9.51%	414,451	12.37%	0.87	0.77
40-44	16,933	8.57%	86	8.35%	366,387	10.94%	0.78	0.76
45-49	11,849	6.00%	61	5.92%	274,608	8.20%	0.73	0.72
50-54	8,583	4.35%	41	3.98%	204,977	6.12%	0.71	0.65
55-59	6,971	3.53%	52	5.05%	179,101	5.35%	0.66	0.94
60-64	5,887	2.98%	39	3.79%	171,701	5.12%	0.58	0.74
65-69	5,214	2.64%	23	2.23%	164,366	4.91%	0.54	0.46
70 & Over	8,801	4.46%	60	5.83%	265,439	7.92%	0.56	0.74
TOTAL*	197,498	100.00%	1,030	100.00%	3,350,324	100.00%		
Male	133,078	62.69%	797	77.00%	1,742,470	52.01%	1.21	1.48
Female	79,209	37.31%	238	23.00%	1,607,854	47.99%	0.78	0.48
TOTAL**	212,287	100.00%	1,035	100.00%	3,350,324	100.00%		

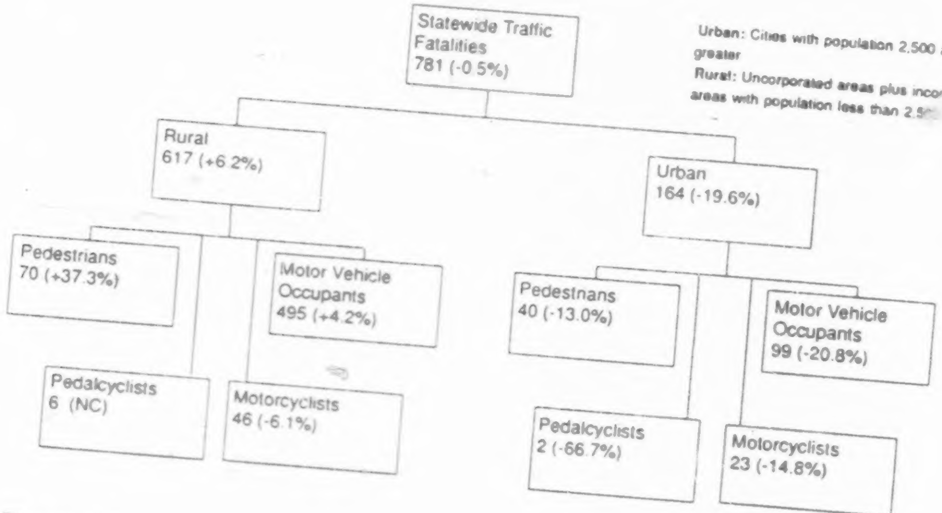
*Total does not include 30,305 drivers whose age was not stated.
**Total does not include 15,516 drivers whose sex was not stated.

Source: WSP. DOL

Figure 1-6

Traffic Fatalities

In 1989 and Percent of Change from 1988


Statewide Traffic Fatalities 781 (-0.5%)
Rural 617 (+6.2%)
Urban 164 (-19.6%)
Pedestrians 70 (+37.3%)
Motor Vehicle Occupants 495 (+4.2%)
Pedalcyclists 6 (NC)
Motorcyclists 46 (-6.1%)
Pedestrians 40 (-13.0%)
Motor Vehicle Occupants 99 (-20.8%)
Pedalcyclists 2 (-66.7%)
Motorcyclists 23 (-14.8%)

Urban: Cities with population 2,500 and greater

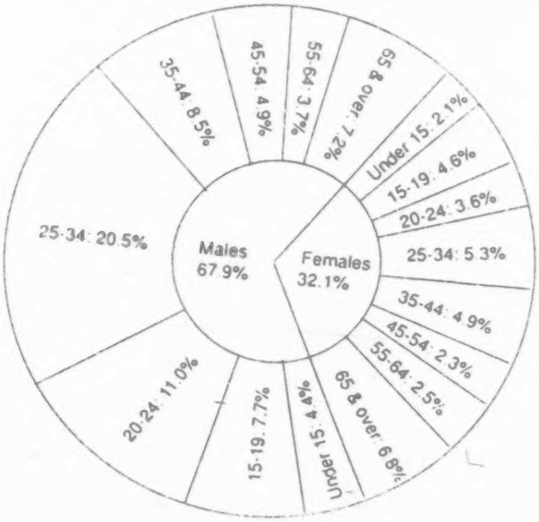
Rural: Uncorporated areas plus incorporated areas with population less than 2,5

Source: WSP

Figure 1-7

Traffic Fatalities by Age and Sex

1989



Source: WSP

H. Collisions by Type

Multiple-vehicle collisions increased slightly from 94,304 in 1988 to 96,549 in 1989 (Figure 1-8). Single-vehicle collisions also increased slightly (Figure 1-9). Vehicle-pedestrian collisions increased 2.8% from 1988 (Figure 1-10). Vehicle-pedalcycle collisions dropped by 3.3% in 1989, the second year of decrease after a five-year trend of increases in pedalcycle collisions from 1982 through 1987 (Figure 1-11).

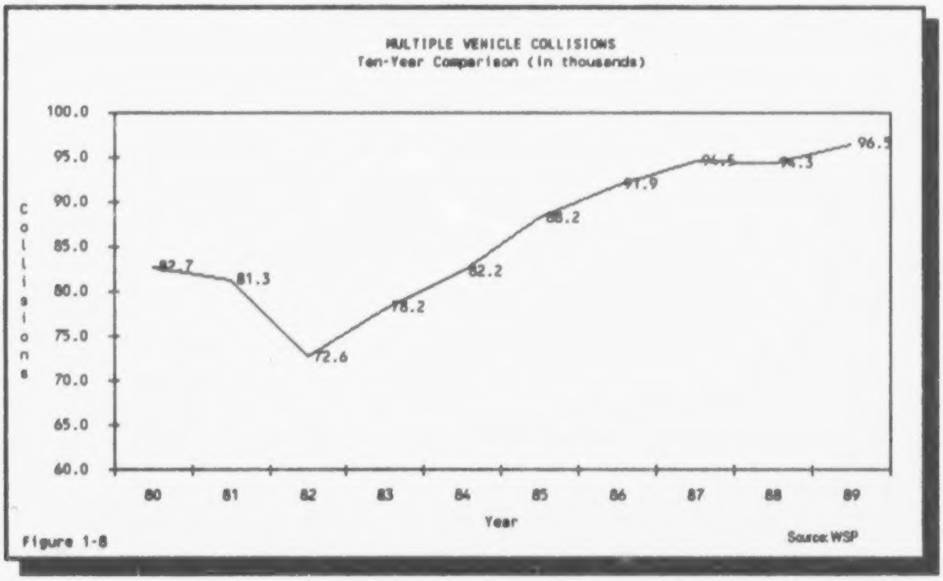


Figure 1-8

Source: WSP

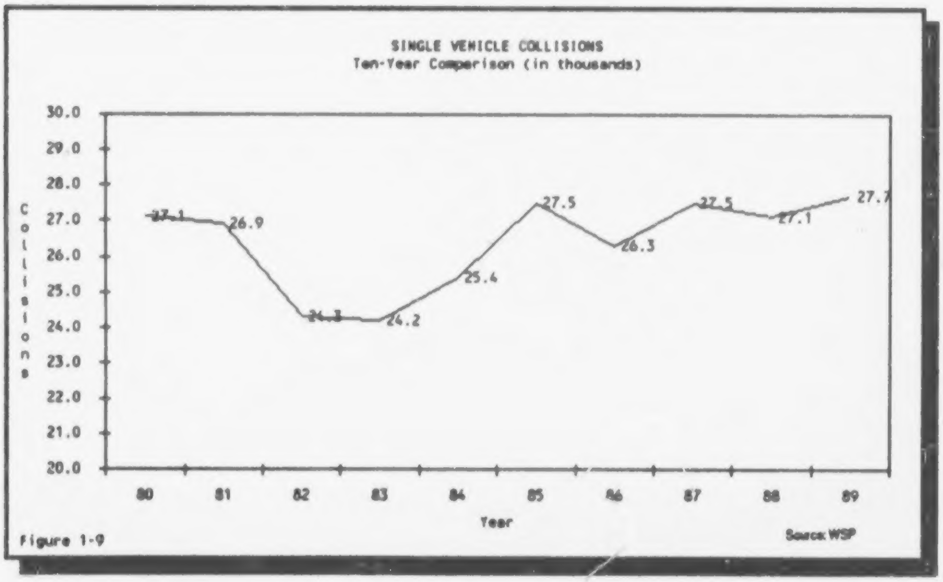


Figure 1-9

Source: WSP

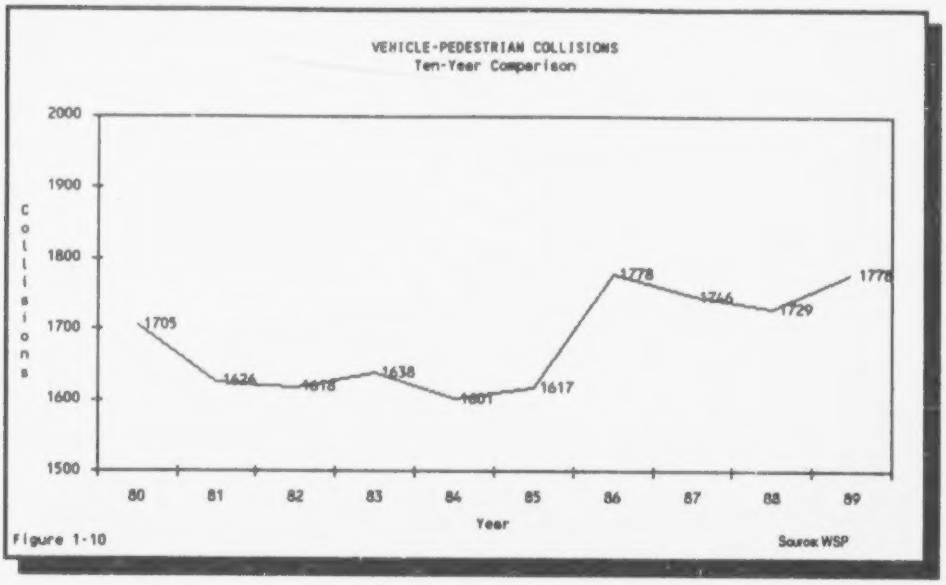


Figure 1-10

Source: WSP

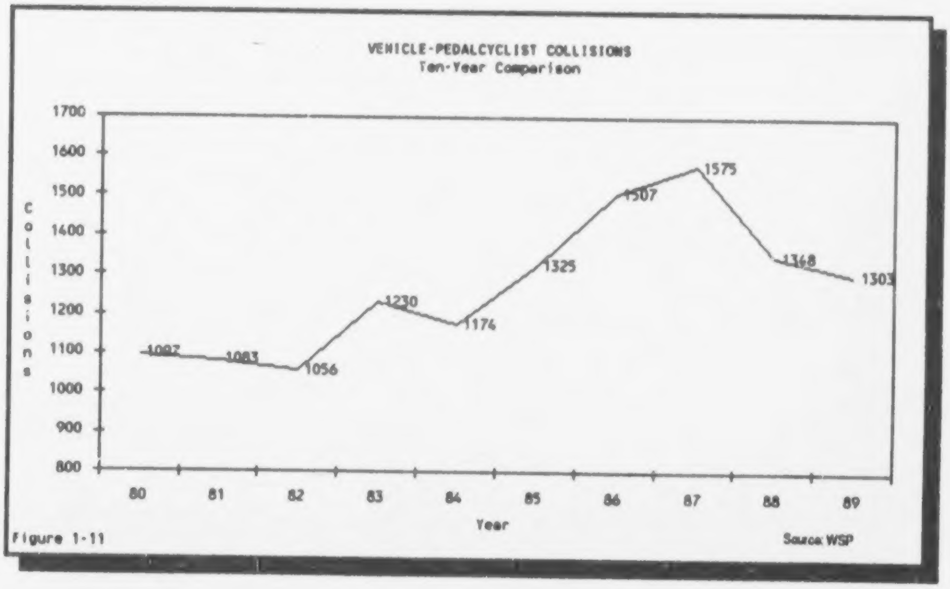


Figure 1-11

Source: WSP

Table 1-10

COLLISION RATES BY COUNTY POPULATION
1989

County	1989 Population	Traffic Deaths		Traffic Injuries		Total Collisions	
		Number	Rate*	Number	Rate**	Number	Rate**
Over 1,000,000							
1. King	1,446,000	145	10.03	26,719	18.48	48,733	33.70
250,000 to 750,000							
1. Pierce	560,900	67	11.95	10,330	18.42	15,046	26.82
2. Snohomish	430,400	66	15.33	6,886	16.00	11,831	27.49
3. Spokane	358,000	43	12.01	5,199	14.52	9,073	25.34
100,000 to 250,000							
1. Clark	220,400	33	14.97	2,893	13.13	4,962	22.51
2. Yakima	187,800	46	24.49	2,308	12.29	4,384	23.34
3. Kitsap	181,500	29	15.98	2,358	12.99	3,864	21.29
4. Thurston	155,100	17	10.96	2,408	15.53	4,211	27.15
5. Whatcom	122,200	32	26.19	1,719	14.07	3,092	25.30
6. Benton	104,100	11	10.57	1,084	10.41	2,064	19.83
50,000 to 100,000							
1. Cowlitz	82,100	21	25.58	1,134	13.81	2,027	24.69
2. Skagit	72,400	17	23.48	1,280	17.68	2,134	29.48
3. Grays Harbor	63,600	14	22.01	850	13.36	1,738	27.33
4. Lewis	58,000	23	39.66	951	16.40	1,644	28.34
5. Island	55,300	8	14.47	485	8.77	882	15.95
6. Clallam	55,200	19	34.42	617	11.18	1,266	22.93
7. Grant	51,900	23	44.32	601	11.58	993	19.13
25,000 to 50,000							
1. Walla Walla	48,800	8	16.39	491	10.06	946	19.39
2. Chelan	48,600	15	30.86	802	16.50	1,469	30.23
3. Whitman	37,600	13	34.57	353	9.39	672	17.87
4. Mason	37,500	15	40.00	575	15.33	931	24.83
5. Franklin	34,200	11	32.16	437	12.78	848	24.80
6. Okanogan	31,700	13	41.01	350	11.04	653	20.60
7. Stevens	30,500	6	19.67	361	11.84	517	16.95
8. Kittitas	25,400	20	78.74	600	23.62	1,209	47.60
9. Douglas	25,400	6	23.62	296	11.65	446	17.56
10,000 to 25,000							
1. Jefferson	19,200	14	72.92	309	16.09	482	25.10
2. Pacific	17,700	5	28.25	240	13.56	401	22.66
3. Asotin	17,600	1	5.68	113	6.42	233	13.24
4. Klickitat	16,700	2	11.98	215	12.87	382	22.87
5. Adams	13,400	13	97.01	290	21.64	422	31.49
Under 10,000							
1. San Juan	9,700	1	10.31	87	8.97	174	17.94
2. Pend Oreille	8,900	5	56.18	135	15.17	225	25.28
3. Lincoln	8,800	3	34.09	139	15.80	189	21.48
4. Skamania	8,100	5	61.73	127	15.68	219	27.04
5. Ferry	6,100	5	81.97	114	18.69	182	29.84
6. Columbia	4,100	4	97.56	66	16.10	118	28.78
7. Wahkiakum	3,500	1	28.57	43	12.29	75	21.43
8. Garfield	2,300	1	43.48	28	12.17	63	27.39
TOTAL	4,660,700	781	16.76	73,993	15.88	128,800	27.64

*Frequency per 100,000 population
**Frequency per 1,000 population

Source: WSP, OFM

Table 1-10a

TRAFFIC COLLISIONS AND COLLISIONS RATES IN UNINCORPORATED AREAS
BY COUNTY & POPULATION 1989

County	Unincorp. Population	Total Collisions		Traffic Fatalities		Traffic Injuries		Pedestrians		Pedalcyclists	
		Number	Rate**	Number	Rate*	Number	Rate**	Fatals & Injuries	Rate*	Fatals & Injuries	Rate*
Over 100,000											
1. King	590,456	13,370	22.64	79	13.38	8,391	14.21	175	29.64	125	21.17
2. Pierce	335,644	6,794	20.24	49	14.60	4,901	14.60	88	26.22	61	18.17
3. Snohomish	242,944	5,441	22.40	57	23.46	3,588	14.77	45	18.52	49	20.17
4. Spokane	168,468	3,048	18.09	34	20.18	2,031	12.06	24	14.25	31	18.40
5. Clark	160,080	3,224	20.16	26	16.24	2,037	12.72	35	21.86	37	23.11
6. Kitsap	132,468	2,525	19.06	28	21.14	1,678	12.67	30	22.65	20	15.10
7. Whatcom	122,200	1,409	11.53	23	18.82	944	7.73	14	11.46	10	8.18
25,000 to 100,000											
1. Yakima	95,628	1,900	19.87	38	39.74	1,244	13.01	12	12.55	6	6.27
2. Thurston	94,630	1,776	18.77	16	16.91	1,134	11.98	21	22.19	13	13.74
3. Island	38,430	664	17.28	8	20.82	390	10.15	5	13.01	4	10.41
4. Skagit	34,920	1,175	33.65	13	37.23	740	21.19	6	17.18	3	8.59
5. Lewis	34,870	1,004	28.79	20	57.36	652	18.70	7	20.07	3	8.60
6. Cowlitz	34,755	631	18.16	17	48.91	386	11.11	10	28.77	2	5.75
7. Clallam	31,380	635	20.24	17	54.17	347	11.06	3	9.56	1	3.19
8. Mason	29,880	690	23.09	13	43.51	452	15.13	5	16.73	1	3.35
9. Benton	27,775	531	19.12	6	21.60	320	11.52	0	0.00	4	14.40
10,000 to 25,000											
1. Grant	24,938	632	25.34	22	88.22	434	17.40	8	32.08	1	4.01
2. Grays Harbor	24,106	899	37.29	10	41.48	564	23.40	6	24.89	11	45.63
3. Stevens	21,867	434	19.85	6	27.44	324	14.82	3	13.72	1	4.57
4. Chelan	21,335	748	35.06	15	70.31	484	22.69	3	14.06	5	23.44
5. Douglas	20,259	446	22.01	6	29.62	296	14.61	4	19.74	3	14.81
6. Okanogan	17,663	590	33.40	13	73.60	318	18.00	5	28.31	1	5.66
7. Walla Walla	15,810	357	22.58	5	31.63	221	13.98	2	12.65	0	0.00
8. Franklin	14,153	219	15.47	5	35.33	143	10.10	0	0.00	0	0.00
9. Jefferson	12,260	395	32.22	14	114.19	268	21.86	0	0.00	2	16.31
10. Pacific	11,083	367	33.11	5	45.11	231	20.84	3	27.07	2	18.05
11. Klickitat	10,245	349	34.07	2	19.52	206	20.11	4	39.04	0	0.00
Under 10,000											
1. Asotin	9,875	107	10.84	1	10.13	61	6.18	0	0.00	2	20.25
2. Kittitas	9,840	1,015	103.15	20	203.25	533	54.17	2	20.33	2	20.33
3. San Juan	8,160	174	21.32	1	12.25	87	10.66	2	24.51	2	24.51
4. Whitman	6,738	343	50.91	12	178.09	262	38.88	1	14.84	1	14.84
5. Skamania	6,555	219	33.41	5	76.28	127	19.37	2	30.51	0	0.00
6. Adams	6,143	353	57.46	13	211.62	255	41.51	7	113.95	1	16.28
7. Pend Oreille	6,107	225	36.84	5	81.87	135	22.11	1	16.37	1	16.37
8. Ferry	5,075	182	35.86	5	98.52	114	22.46	0	0.00	1	19.70
9. Lincoln	3,567	189	52.99	3	84.10	139	38.97	1	28.03	1	28.03
10. Wahkiakum	2,885	75	26.00	1	34.66	43	14.90	0	0.00	1	34.66
11. Columbia	1,270	83	65.35	3	236.22	51	40.16	0	0.00	0	0.00
12. Garfield	665	63	94.74	1	150.38	28	42.11	1	150.38	0	0.00
TOTAL	2,435,127	53,281	21.88	617	25.34	34,559	14.19	535	867.10	408	661.26

*Frequency per 100,000 population
**Frequency per 1,000 population

Source: WSP

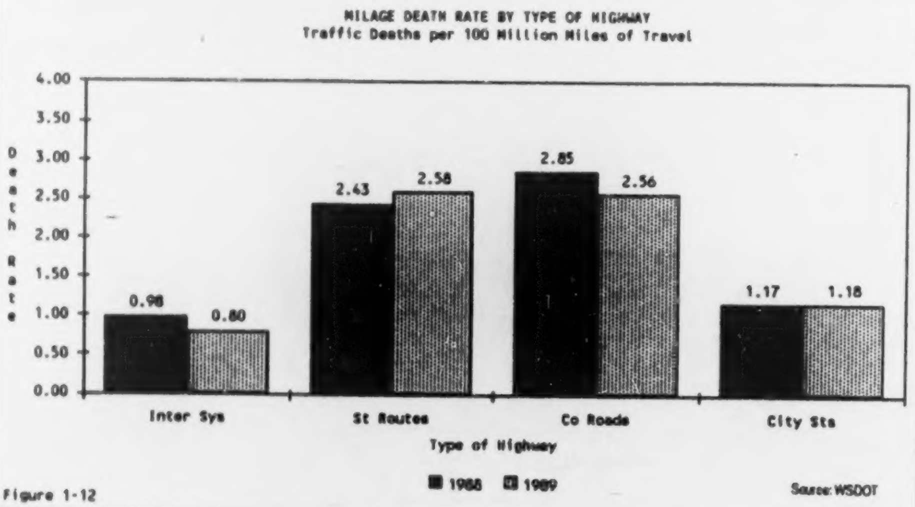


Figure 1-12

Source: WSDOT

Table 1-11

COLLISION RATES BY CITY POPULATION
1989

City	1989 Population	Traffic Deaths*		Traffic Injuries*		Total Collisions*	
		Number	Rate**	Number	Rate***	Number	Rate**
250,000 and Over							
1. Seattle	497,200	34	6.84	13,704	27.56	21,600	43.44
100,000 to 250,000							
1. Spokane	358,000	9	2.51	3,114	8.70	5,903	16.49
2. Tacoma	162,100	14	8.64	4,563	28.15	6,674	41.17
50,000 to 100,000							
1. Bellevue	86,350	3	3.47	1,471	17.04	2,885	33.41
2. Everett	64,170	5	7.79	1,635	25.48	2,923	45.55
3. Yakima	50,610	6	11.86	820	16.20	1,882	37.19
25,000 to 50,000							
1. Bellingham	47,290	9	19.03	688	14.55	1,521	32.16
2. Vancouver	44,450	7	15.75	722	16.24	1,460	32.85
3. Renton	38,480	1	2.60	1,061	27.57	2,213	57.51
4. Bremerton	37,080	1	2.70	565	15.24	1,078	29.07
5. Kennewick	36,880	2	5.42	432	11.71	871	23.62
6. Kirkland	36,620	5	13.65	624	17.04	1,275	34.82
7. Kent	34,860	8	22.95	1,185	33.99	2,007	57.57
8. Redmond	33,400	2	5.99	558	16.71	1,050	31.44
9. Auburn	32,460	7	21.57	743	22.89	1,285	39.59
10. Olympia	31,070	0	0.00	758	24.40	1,510	48.60
11. Longview	30,320	4	13.19	532	17.55	904	29.82
12. Richland	29,970	3	10.01	303	10.11	592	19.75
13. Edmonds	29,720	1	3.36	261	8.78	602	20.26
14. Lynnwood	26,280	2	7.61	753	28.65	1,420	54.03
15. Walla Walla	25,690	2	7.79	247	9.61	542	21.10
15,000 to 25,000							
1. Pullman	22,270	1	4.49	86	3.86	292	13.11
2. Puyallup	21,290	1	4.70	367	17.24	695	32.64
3. Mercer Island	20,380	1	4.91	162	7.95	323	15.85
4. Wenatchee	19,950	0	0.00	284	14.24	653	32.73
5. Mountlake Terrace	17,590	1	5.69	225	12.79	422	23.99
6. Pasco	17,560	6	34.17	294	16.74	629	35.82
7. Port Angeles	17,490	2	11.44	210	12.01	482	27.56
8. Aberdeen	17,140	3	17.50	181	10.56	542	31.62
9. Lacey	16,940	0	0.00	297	17.53	556	32.82
10,000 to 15,000							
1. Des Moines	14,820	0	0.00	205	13.83	337	22.74
2. Mount Vernon	14,790	1	6.76	287	19.41	503	34.01
3. Oak Harbor	14,790	0	0.00	95	6.42	218	14.74
4. Centralia	11,840	3	25.34	205	17.31	422	35.64
5. Ellensburg	11,730	0	0.00	67	5.71	194	16.54
6. Kelso	11,270	0	0.00	197	17.48	443	39.31
7. Moses Lake	10,810	0	0.00	120	11.10	266	24.61
8. Anacortes	10,600	0	0.00	66	6.23	144	13.58
9. Bothell	10,430	0	0.00	134	12.85	293	28.09
TOTAL	2,016,690	144	7.15	38,221	18.97	67,611	33.56

*Does not include collisions on limited access roads or freeways

**Frequency per 100,000 population

***Frequency per 1,000 population

Source: WSP, OFM

II. Alcohol Involvement

In 1989, 11.2% of all drivers involved in investigated traffic collisions had been drinking alcohol. This is a 3.4% decrease from 1988 and continues a downward trend (Figure 2-1).

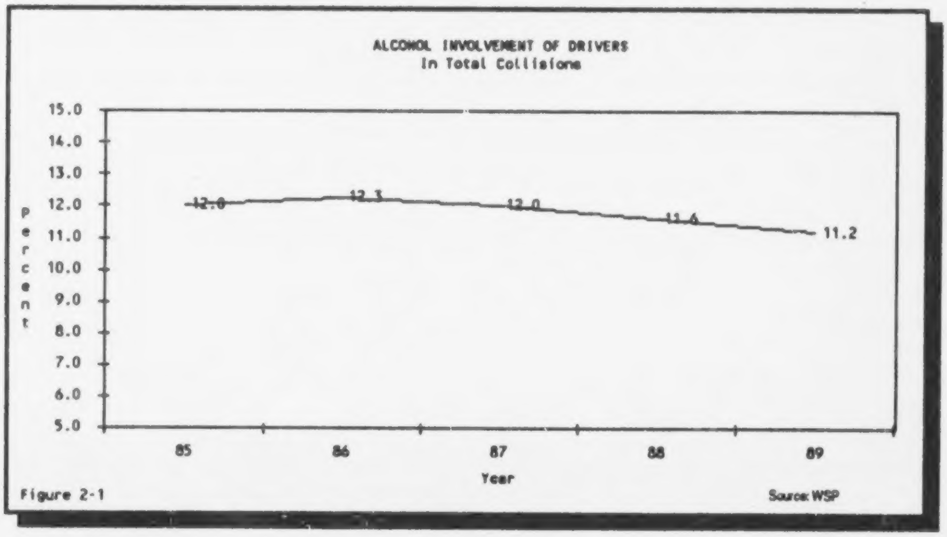


Figure 2-1

Source: WSP

A. Drivers Involved In Fatal Collisions

In 1989, 35.0% of the drivers involved in statewide fatal collisions had been drinking intoxicants. This decreased from the 40.6% involvement recorded in 1988 and from the 39.1% baseline period (Table 2-1). In injury collisions, 13.4 drivers out of every 100 had been drinking prior to being involved (Table 2-1a, 2-1b)).

Table 2-1

Source: WSP

SOBRIETY OF DRIVERS INVOLVED IN FATAL COLLISIONS
Statewide Comparison

Condition of Driver (Sobriety)	Year		Previous 3 -Year Average	% of Change	
	1989	1988		89-88	89 - 3-Year Average
Had been drinking - ability impaired	309	340	314	-9.1%	-1.6%
Had been drinking - ability not impaired	33	45	45	-26.7%	-27.2%
Had been drinking - sobriety unknown	12	15	17	-20.0%	-30.8%
Had not been drinking	657	586	587	12.1%	11.9%
Not stated	37	41	41	-9.8%	-9.0%
Total drivers drinking	354	400	377	-11.5%	-6.0%
Total drivers - excluding not stated	1,011	986	964	2.5%	4.9%
Total drivers	1,048	1,027	1,005	2.0%	4.3%
No. drinking drivers per 100 involved	35.0	40.6	39.1	-13.7%	-10.5%
No. drunk drivers per 100 involved	30.6	34.5	32.6	-11.4%	-6.2%

Table 2-1a

Source: WSP

SOBRIETY OF DRIVERS INVOLVED IN INJURY COLLISIONS
Statewide Comparison

Condition of Driver (Sobriety)	Year		Previous 3 -Year Average	% of Change	
	1989	1988		89-88	89 - 3-Year Average
Had been drinking - ability impaired	5,677	5,306	5,165	7.0%	9.9%
Had been drinking - ability not impaired	1,620	1,657	1,734	-2.2%	-6.6%
Had been drinking - sobriety unknown	1,796	2,198	2,238	-18.3%	-19.7%
Had not been drinking	58,541	59,644	56,344	-1.8%	3.9%
Not stated	5,812	4,992	5,057	16.4%	14.9%
Total drivers drinking	9,093	9,161	9,137	-0.7%	-0.5%
Total drivers - excluding not stated	67,634	68,805	65,481	-1.7%	3.3%
Total drivers	73,446	73,797	70,538	-0.5%	4.1%
No. drinking drivers per 100 involved	13.4	13.3	14.0	1.0%	-3.8%
No. drunk drivers per 100 involved	8.4	7.7	7.9	8.8%	6.3%

Table 2-1b

Source: WSP

SOBRIETY OF DRIVERS INVOLVED IN ALL INVESTIGATED COLLISIONS
Statewide Comparison

Condition of Driver (Sobriety)	Year		Previous 3-Year Average	% of Change	
	1989	1988		89-88	89 - 3-Year Average
Had been drinking - ability impaired	9,901	9,532	9,441	3.9%	4.9%
Had been drinking - ability not impaired	3,184	3,368	3,537	-5.5%	-10.0%
Had been drinking - sobriety unknown	3,671	5,149	5,178	-28.7%	-29.1%
Had not been drinking	132,731	137,183	133,414	-3.2%	-0.5%
Not stated	19,181	16,083	16,811	19.3%	14.1%
Total drivers drinking	16,756	18,049	18,156	-7.2%	-7.7%
Total drivers - excluding not stated	149,487	155,232	151,570	-3.7%	-1.4%
Total drivers	168,668	171,315	168,380	-1.5%	0.2%
No. drinking drivers per 100 involved	11.2	11.6	12.0	-3.6%	-6.5%
No. drunk drivers per 100 involved	6.6	6.1	6.2	7.9%	6.3%

B. Alcohol Involvement By Age Group

Drivers under 30 years of age continue to be over-represented in alcohol-related collisions. The 16- to 20-year-old group composed 7.3% of all licensed drivers in the state in 1989, but they were involved in 14.5% of all alcohol-related collisions. This age group was involved in nearly two times more alcohol-related collisions than the percentage of licensed drivers it represented by a ratio of 1.97 (Figure 2-2). The over-involvement ratio for drivers aged 21-24 was 2.52 in 1989. This continues a fairly constant over-representation ratio during the past 5 years (Figure 2-3). Last year, the 25- to 29-year age group was involved in 1.8 times more alcohol-related collisions than the percentage of licensed drivers the group represented (Figure 2-4). The age group 30-54 was under represented by a ratio of 0.8 (Figure 2-5), as were the age groups 55-64 by a ratio of .31 (Figure 2-6), and 65 years and older by a ratio of .18 (Figure 2-7).

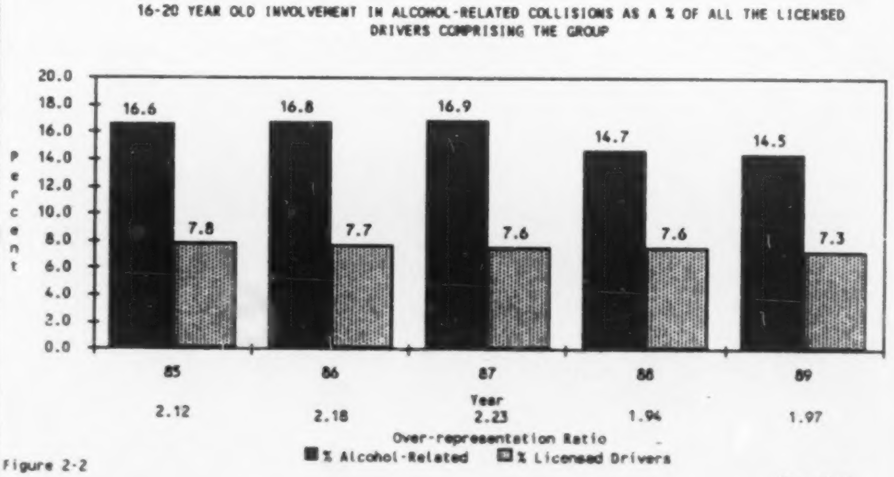


Figure 2-2

Source: WSP

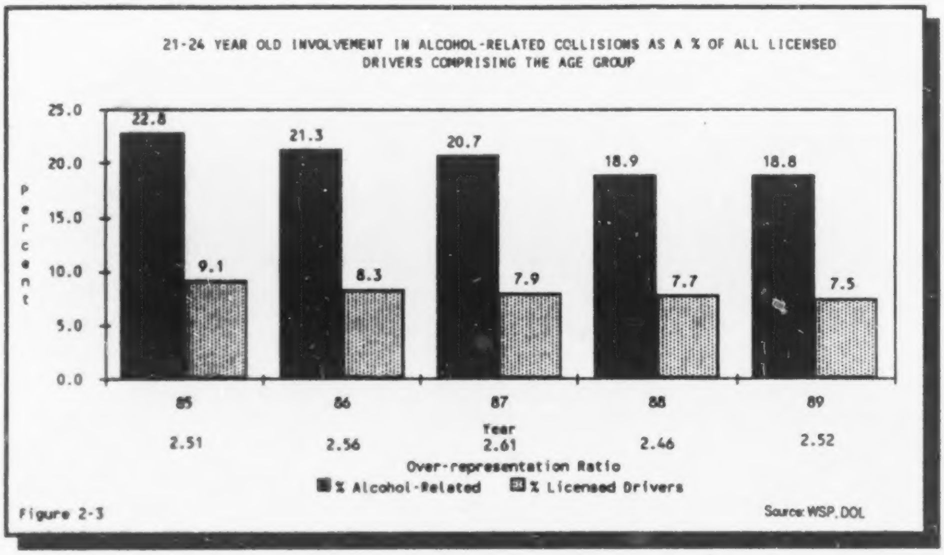


Figure 2-3

Source: WSP, DOL

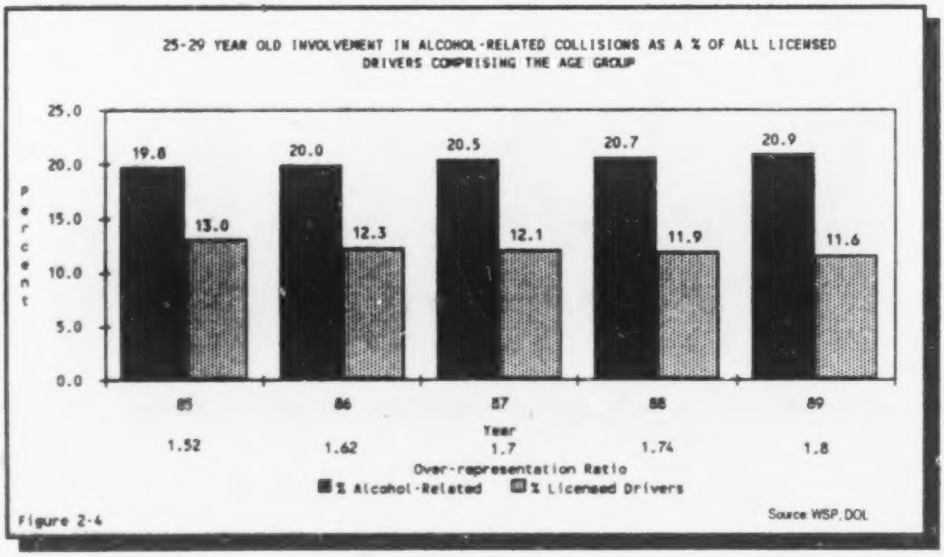


Figure 2-4

Source: WSP, DOL

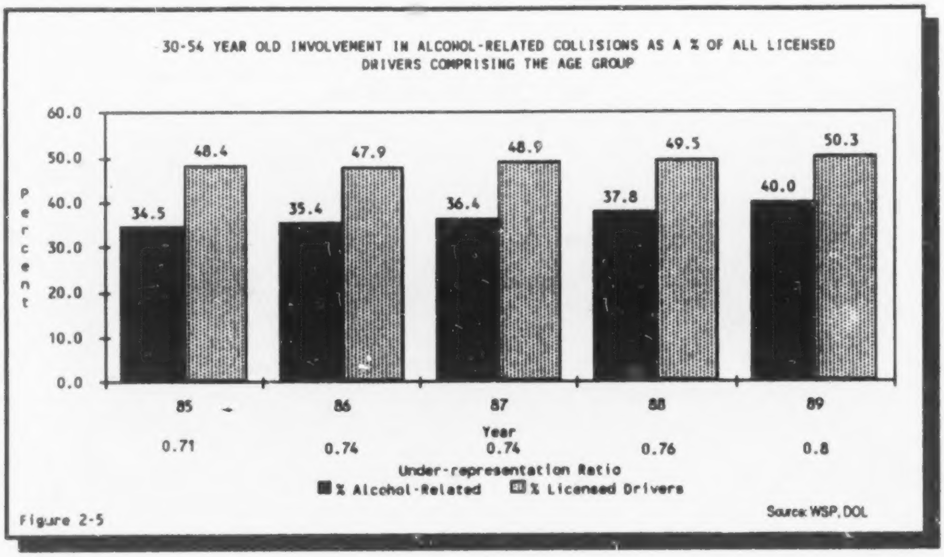

30-54 YEAR OLD INVOLVEMENT IN ALCOHOL-RELATED COLLISIONS AS A % OF ALL LICENSED DRIVERS COMPRISING THE AGE GROUP

Figure 2-5

Source: WSP, DOL

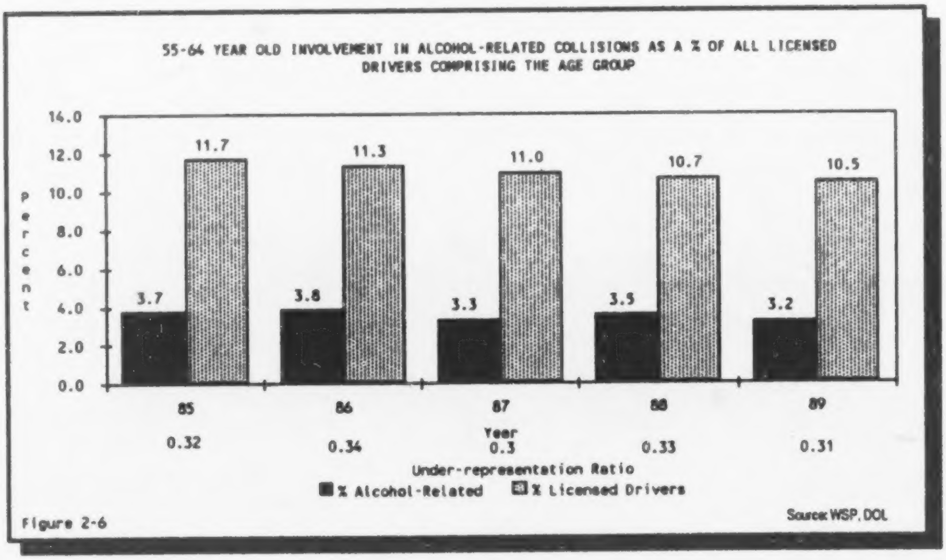

55-64 YEAR OLD INVOLVEMENT IN ALCOHOL-RELATED COLLISIONS AS A % OF ALL LICENSED DRIVERS COMPRISING THE AGE GROUP

Figure 2-6

Source: WSP, DOL

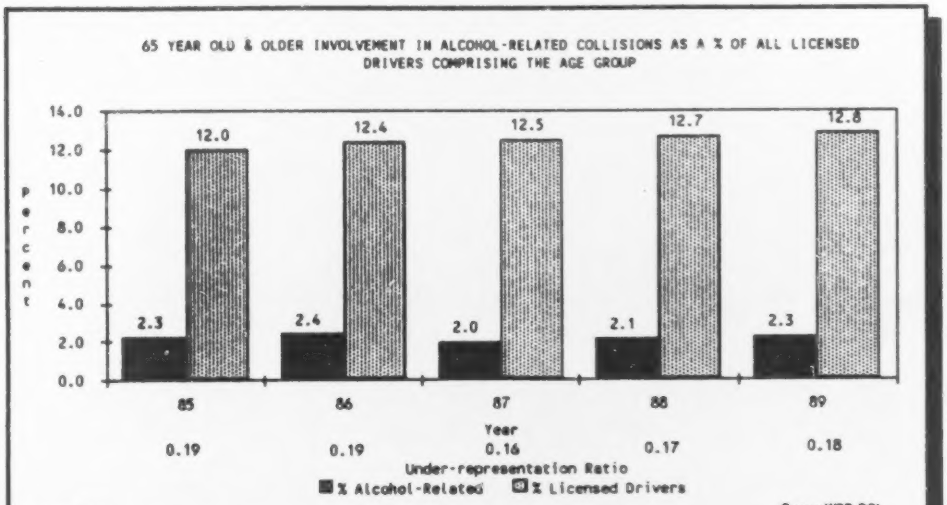


Figure 2-7

Source: WSP, DOL

C. Drivers Involved in Alcohol-Related Collisions

Data for all collision involvement by driver's age and percent of vehicle miles traveled for each age group reveal that the 16-17 year olds have the greatest over-representation in all reported collisions at 4.17. The 18-20 year olds were the second most over-represented group. The age group with the greatest under-representation based on miles traveled was the 55-64 category. Those in the 16- to 17-year-old bracket also displayed the greatest over-representation in alcohol-related collisions based on miles traveled. Second in this ranking was again the 18- to 20-year-old group. The age group 55-64 recorded the greatest under-representation in alcohol-involved collisions with a 0.28 ratio (Table 2-2).

Table 2-2

ALL REPORTED COLLISIONS & ALCOHOL-RELATED COLLISIONS
Comparison of Miles Traveled

Driver Age	% of Vehicle Miles Traveled*	Drivers in All Collisions		Alcohol-Related Collisions	
		%	Over/Under Ratio	%	Over/Under Ratio
16-17	1.44	6.01%	4.17	3.31%	2.30
18-20	5.55	11.36%	2.05	11.49%	2.07
21-24	12.58	12.21%	0.97	18.82%	1.50
25-34	29.24	27.11%	0.93	36.82%	1.26
35-44	21.18	19.36%	0.91	17.24%	0.81
45-54	12.97	10.35%	0.80	6.84%	0.53
55-64	11.58	6.51%	0.56	3.23%	0.28
65 & Over	5.34	7.10%	1.33	2.25%	0.42

Source - Nationwide Personal Transportation Study - U.S. Dept. of Transportation, 1983-84
- Accident Records Unit - Washington State Patrol

Source: WSP, USDOT

Table 2-3 presents a summary of the number of persons killed and injured, number of property damage collisions, and total investigated collisions for drivers under the influence (legally drunk), all drinking drivers (had been drinking but not legally drunk), and non-drinking drivers. Of the had-been-drinking driver collisions, there were 9.5% fewer persons killed and 2.6% fewer received disabling injuries. In addition, there were 2.0% fewer "possible injuries." Property-damage-only collisions decreased by 13.9%, while persons with non-disabling injuries increased by 1.5% in 1989. Of the drivers under the influence, persons killed decreased 6.1% compared to last year. All levels of injury severity increased over last year. Property-damage-only collisions recorded a 0.5% increase. Total "DUI" collisions increased 4.0% overall. Alcohol-related (drivers who had been drinking) collisions recorded a 7.2% decrease when compared to the previous year.

Table 2-3

SUMMARY OF PERSONS KILLED & INJURED IN ALCOHOL-RELATED COLLISIONS
Two-Year Comparison

	Drivers Under the Influence			Drivers Who Had Been Drinking*			Non-Drinking Driver Collisions***		
Status	1989	1988	% of Change	1989	1988	% of Change	1989	1988	% of Change
Persons Killed	353	376	-6.1%	392	433	-9.5%	389	352	10.5%
Persons Injured	8,898	8,359	6.4%	13,660	13,724	-0.5%	49,163	49,348	-0.4%
Disabling	1,840	1,832	0.4%	2,595	2,665	-2.6%	5,280	5,470	-3.5%
Non-Disabling	4,316	3,986	8.3%	6,516	6,418	1.5%	17,927	17,835	0.5%
Possible Injury	2,742	2,541	7.9%	4,549	4,641	-2.0%	25,956	26,043	-0.3%
Property Damage Collisions**	3,888	3,867	0.5%	7,000	8,129	-13.9%	48,920	48,517	0.8%
Total Collisions	9,816	9,436	4.0%	16,061	17,299	-7.2%	82,237	81,789	0.5%

*Including Drivers Under the Influence
**Minimum damage for a reportable collision was increased from $300 to $500 on 10-1-87.
***Investigated Collisions Only

Source: WSP

D. DWI Convictions

In 1989, a higher number of convictions for alcohol-related traffic offenses reversed a six-year downward trend that started in 1983. The 15,657 convictions in 1989 for DWI/Physical Control violations still represented a drop of 46.7% from the 29,385 convictions recorded for the year of 1982. The number of DWI drivers involved in investigated collisions last year increased to 9,900, the highest number recorded since 1981 when 11,666 drivers were involved (Figure 2-8).

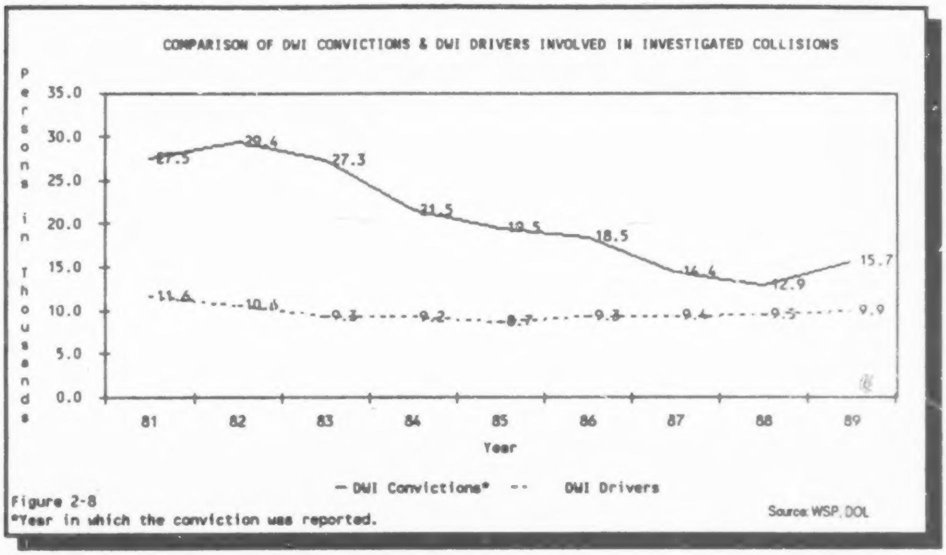


Figure 2-8
*Year in which the conviction was reported.

Source: WSP, DOL

E. Location of Alcohol-Related Collisions

Alcohol-related collisions increased in rural areas and decreased in urban areas during 1989. In 1989, 55.0% of the alcohol-related collisions occurred in rural areas and 45.0% in urban areas (Figure 2-9).

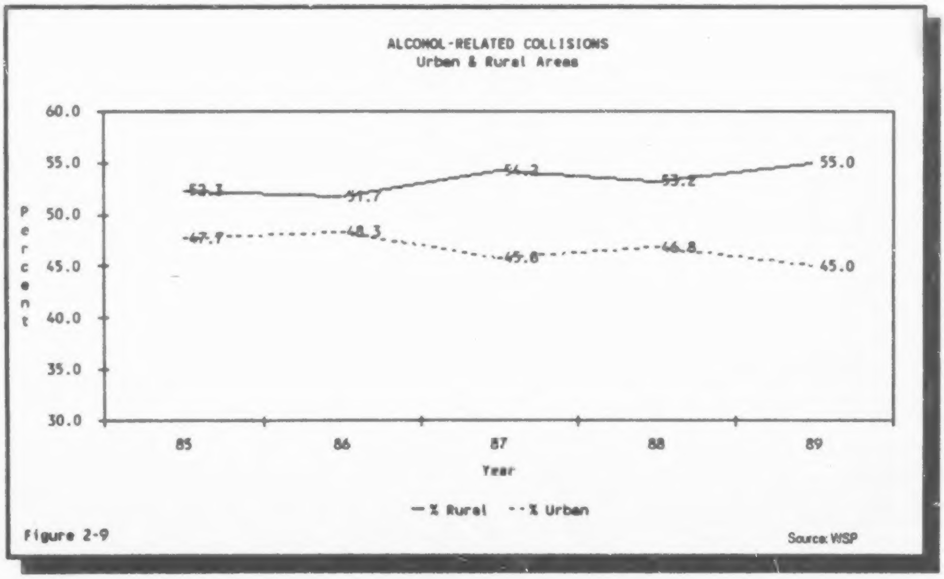


Figure 2-9

Source: WSP

F. Multiple- and Single-Vehicle Collisions

The predominant type of alcohol-related vehicle collisions continued to be multiple-vehicle mishaps in urban areas (Figure 2-10) and single-vehicle collisions in rural areas (Figure 2-11). In urban areas, 66.1% of the collisions involved two or more vehicles as opposed to only 36.6% on rural roads.

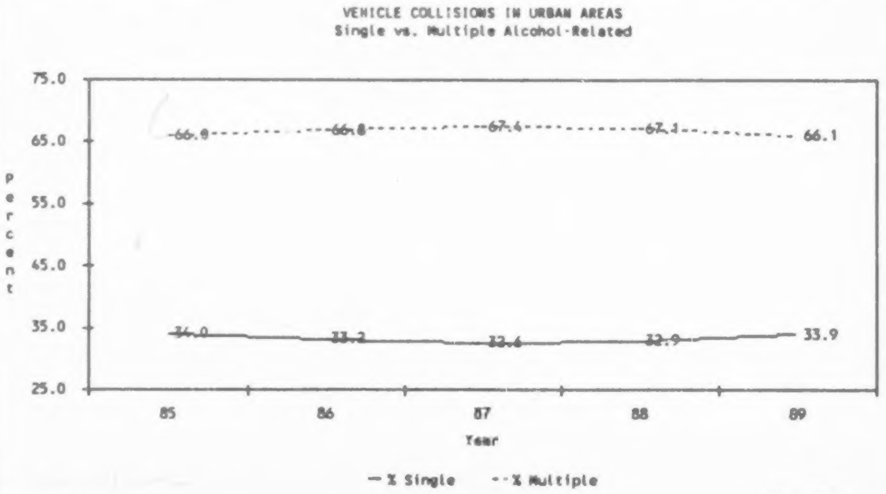


Figure 2-10

Source: WSP

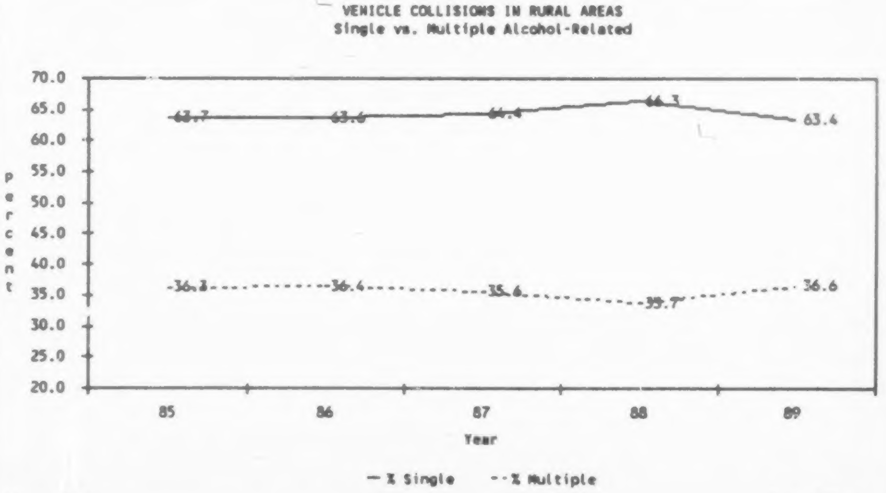


Figure 2-11

Source: WSP

The percentage of all single-vehicle collisions where the driver had been drinking remained relatively stable at nearly half of the total alcohol-involved collisions for 1989. In comparison, single-vehicle collisions represented only 21.5% of the total collisions in 1989 (Figure 2-12). To express the over-representation of alcohol in single vehicle collisions, the percentage of alcohol involvement in single-vehicle collisions is compared to the percentage of single-vehicle collisions in total vehicle collisions. This ratio increased slightly from 2.27 in 1988 to 2.3 in 1989.

Figure 2-12 shows over-involvement of single-vehicle alcohol-involved collisions compared to single-vehicle collisions in total collisions.

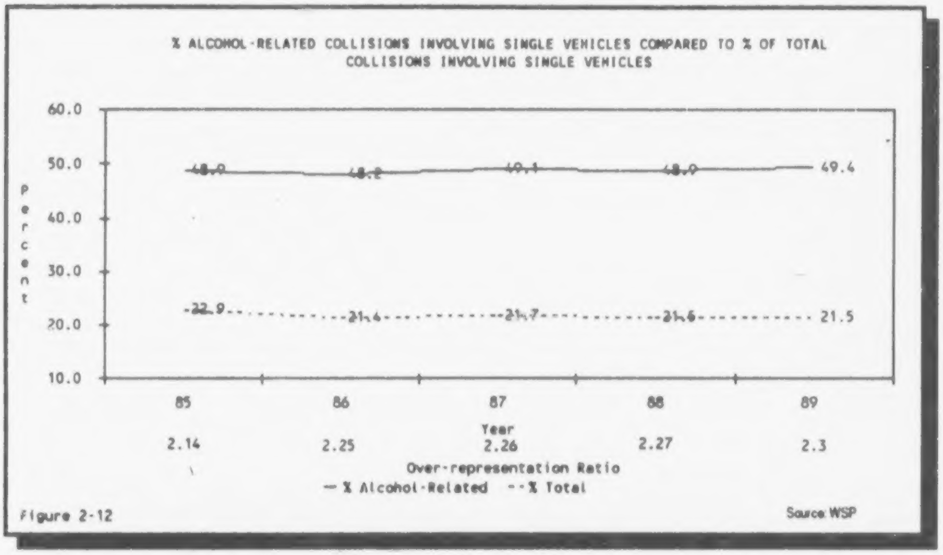
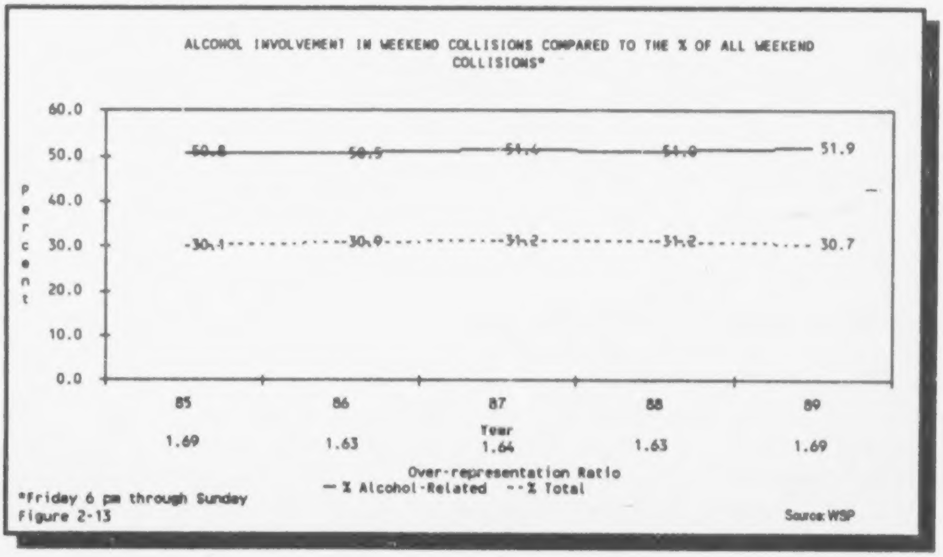


Figure 2-12

Source: WSP

G. Weekend Alcohol Involvement

Weekend alcohol-related collisions occurred at a rate that was 1.69 times greater than the overall percentage of weekend collisions (Friday 6 p.m. to Sunday midnight). This over-representation ratio has remained fairly constant over the previous four years (Figure 2-13). A further breakdown compares the percent-



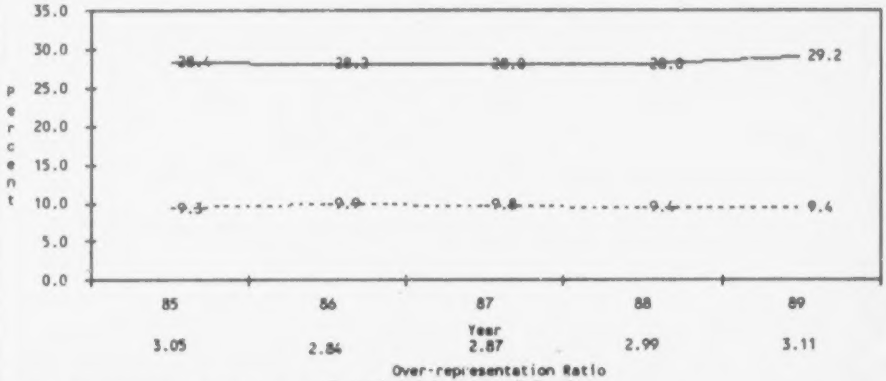
*Friday 6 pm through Sunday

Figure 2-13

Source: WSP

age of alcohol-involved collisions occurring Friday and Saturday between the hours of 8 p.m. to 3 a.m. to the percentage of the total week's collisions occurring in the same time frame; the alcohol-related collisions were more than 3 times over-represented during 1989. This is slightly above the over-representation ratio registered for the previous four years (Figure 2-14).

ALCOHOL-RELAED COLLISIONS OCCURING IN THE SELECT TIME PERIOD* COMPARED TO TOTAL WEEK'S COLLISIONS (SAME TIME PERIOD)



*Friday and Saturday 8 pm to 3 am
Figure 2-14

Source: WSP

H. Fatal Alcohol-Involved Collisions Occurring At Night

The ratio of all nighttime fatal collisions involving alcohol to all alcohol-related fatal collisions increased during 1989 as compared to the previous year and to the four-year baseline. All nighttime fatal collisions composed 52.2% of the year's total fatal collisions, while alcohol-related nighttime fatal collisions increased to 73.8% of all nighttime fatals. Alcohol-related fatal collisions at night over-represent all nighttime fatal collisions by a ratio of 1.42, up from the previous four-year period ratio (Figure 2-15).

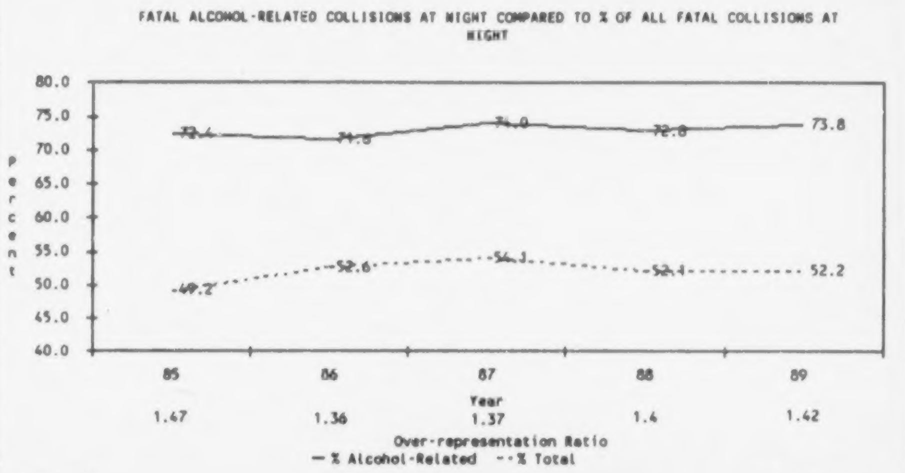


Figure 2-15

Source: WSP

I. Ratio of Drinking and Drunk Drivers Involved In Fatal Traffic Collisions by Roadway Type

Of all drivers involved in fatal collisions in 1989, 35% had been drinking prior to the collision. This is a substantial decrease from 40.6% the previous year and down slightly from the previous five-year average of 38.8% (Figure 2-16). Just over eleven percent (11.2%) of the drivers involved in all investigated collisions had been drinking prior to the collision; a considerable drop from the 18.2 percent reported in 1981. Also recording a significant decrease (-25.4%) during the 8-year period was the number of drivers found to be under the influence while involved in traffic collisions. During last year, however, the ratio of DUI drivers

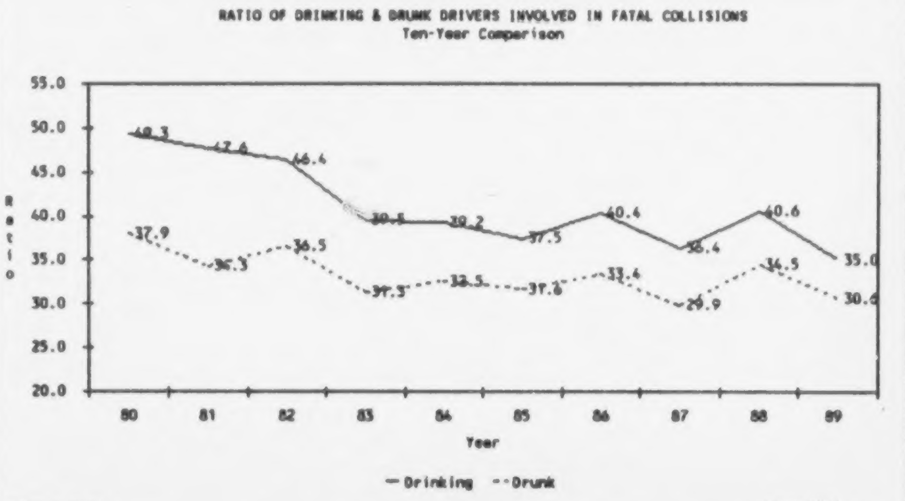


Figure 2-16

Source: WSP

involved in traffic collisions compared to all drivers involved went up from 6.1 drivers per 100 in 1988 to 6.6 in 1989 (Figure 2-17).

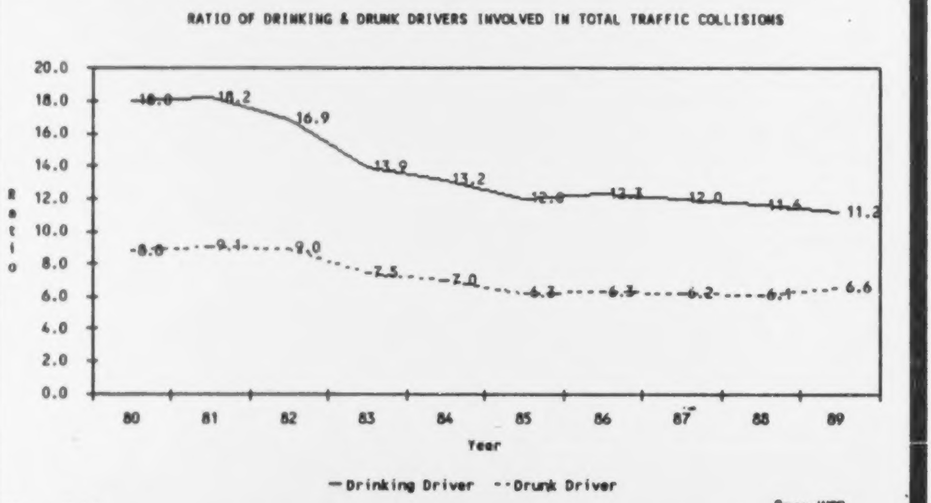


Figure 2-17

Source: WSP

The total frequency of particular blood alcohol concentration (BAC) levels in fatal and serious injury collisions for 1989 by age group is presented in Table 2-4. The 16-20 and 21-24 age groups evidenced the greatest incidence of involvement for .05-.19 BAC levels. At the .10-.14 BAC range, the 21-24 age group had the greatest frequency of occurrences. At the .15 through the .29 BAC levels, the 25-29 age group had the greatest frequency of occurrences. Overall, the 16-20, 21-24, 25-29, and 30-34 age groups displayed the highest incidence of involvement at all BAC levels.

Table 2-4

CHEMICAL TEST FOR INTOXICATION IN FATAL & SERIOUS INJURY COLLISIONS
1989*

Age	Alcohol Level							Test Given No Results	Test Refused	Total Tested
	.00-.04	.05-.09	.10-.14	.15-19	.20-.24	.25-.29	.30 & Up			
16-20	26	75	106	70	26	8	1	134	52	498
21-24	22	54	136	147	60	19	3	171	95	707
25-29	23	47	123	162	88	38	2	175	163	821
30-34	12	30	69	118	75	32	11	142	119	608
35-39	7	22	52	65	61	26	6	99	88	426
40-44	6	14	25	43	30	13	7	43	60	241
45-49	2	8	20	30	32	10	4	26	36	168
50-54	2	4	4	16	8	9	1	16	23	83
55-59	0	4	11	11	10	3	0	16	12	67
60-64	1	4	5	8	4	4	2	7	6	41
65-69	0	2	5	8	2	1	2	7	2	29
Over 69	2	4	6	4	3	2	0	10	2	33
TOTAL	103	268	562	682	399	165	39	846	658	3,722

*This data is for one year only. Up to the 1990 HSP, it has been for four years.

Source: WSP

An analysis of roadway type by day of week on which alcohol-involved fatal and serious injury collisions occurred is given in Table 2-5. County roads accounted for 35.7% of the total weekly collisions compared to 27.5% for city streets. U.S. and state routes totaled 26.6% while the interstates contributed to 8.9% of the weekly total of fatal and serious alcohol-involved collisions during 1989. The table also reveals that during this period of time, Saturday was the day with the greatest frequency of fatal and serious injury collisions involving alcohol. Sunday and Friday were the next highest days in that order (Figure 2-18).

Table 2-5

Source: WSP

FATAL & SERIOUS INJURY COLLISIONS INVOLVING ALCOHOL
Roadway Type by Day of Week

Roadway Type	Day of Week								% of Total Weekly Collisions
	Mon	Tue	Wed	Thu	Fri	Sat	Sun	Total	
County Roads	218	235	240	266	389	548	469	2,365	35.7%
City Streets	163	182	201	205	278	439	356	1,824	27.5%
U.S. & State Routes	146	162	166	186	304	433	367	1,764	26.6%
Interstate & Full Control	65	43	47	68	94	129	145	591	8.9%
Other Routes	8	6	6	7	11	28	23	89	1.3%
Total	600	628	660	732	1,076	1,577	1,360	6,633	100.0%
% of Total	9.0%	9.5%	10.0%	11.0%	16.2%	23.8%	20.5%	######	

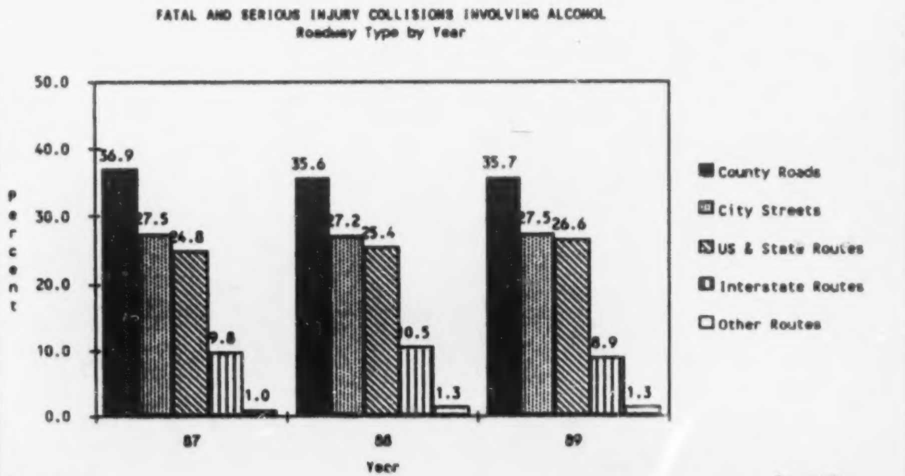


Figure 2-18

Source: WSP

Table 2-6 depicts the number of persons killed and injured by drivers "under the influence" and who "had been drinking" by month for 1987, 1988, and 1989. The last four months of 1989 recorded the highest incidence of persons injured for both categories of alcohol-involved drivers, with the exception of the month of July. During July, 864 persons were injured by drivers "under the influence" and 1,335 persons were injured by drivers who "had been drinking."

Table 2-6

PERSONS KILLED & INJURED IN ALCOHOL-RELATED COLLISIONS BY MONTH
Three-Year Comparison

	Drivers "Under the Influence"						Drivers Who "Had Been Drinking"					
	Persons Killed			Persons Injured			Persons Killed			Persons Injured		
Month	1989	1988	1987	1989	1988	1987	1989	1988	1987	1989	1988	1987
January	25	17	16	617	491	523	26	18	19	976	866	861
February	11	27	25	433	554	488	11	28	27	702	876	849
March	19	42	26	566	669	617	20	47	31	920	1,053	1,061
April	25	27	24	689	684	656	29	36	31	1,066	1,130	1,110
May	42	39	28	784	785	748	46	47	32	1,196	1,284	1,257
June	24	47	44	782	722	662	27	50	47	1,185	1,133	1,130
July	40	37	29	864	842	715	42	45	40	1,335	1,372	1,266
August	31	30	41	744	715	823	36	35	46	1,202	1,170	1,405
September	40	35	33	825	687	730	45	38	39	1,264	1,173	1,151
October	33	27	34	842	756	690	43	32	36	1,261	1,321	1,194
November	32	30	27	862	684	710	33	35	31	1,292	1,126	1,181
December	31	18	10	890	770	608	34	22	17	1,261	1,220	1,090
TOTAL	353	376	337	8,898	8,359	7,970	392	433	396	13,660	13,724	13,555

Source: WSP

III. Youth Involvement

During 1989, youthful drivers 24 years and younger were involved in 58,410 reported collisions, of which 268 were fatal collisions and 25,209 were injury collisions. This was a 4.7% decrease in reported collisions and an 8.8% decrease in fatal collisions, but a 2.8% increase in injury collisions compared to the four-year baseline. There were 496,433 licensed drivers 24 years old and younger in 1989, up slightly from the baseline period. The total collision rate (total collisions per 1,000 licensed drivers) of 11.77 for 1989 was down slightly from the 12.20 rate for the baseline average (Table 3-1).

Table 3-1

YOUTHFUL DRIVERS (24 YEARS & YOUNGER) INVOLVED IN COLLISIONS
Five-Year Comparison

Collisions & Rates	Year 1989	1988	1987	1986	1985	Previous 4-Year Average	% of Change 89 - 4-Year Average
Youthful drivers involved in							
Total Collisions	58,410	60,695	63,531	61,568	59,465	61,315	-4.7%
Fatal Collisions	268	290	286	283	316	294	-8.8%
Injury Collisions	25,209	25,809	22,834	25,462	23,951	24,514	2.8%
Licensed Drivers	496,433	497,527	490,144	485,889	504,107	494,417	0.4%
Fatal Collision Ratio*	4.59	4.78	4.50	4.60	5.31	4.80	-4.4%
Fatal Rate**	0.54	0.58	0.58	0.58	0.63	0.59	-9.1%
Total Collision Rate***	11.77	12.20	12.96	12.67	11.80	12.41	-5.2%

* Fatal Collisions per 1,000 total collisions
** Fatal Collisions per 1,000 licensed drivers
*** Youthful drivers involved per 100 licensed

Source: WSP, DOL

A. Youthful Drivers Involvement In Collisions By First Harmful Event

In 1989, 74.1% of those drivers age 24 years and younger involved in collisions collided with other moving vehicles. This type of collision also resulted in the greatest percentage of fatal collisions (47.0%) and injury collisions (72.0%). Single-vehicle collisions with fixed objects led to the second highest percentage of youthful driver involvement in total, fatal and injury collisions at 15.1%, 26.9% and 16.2% respectfully (Table 3-2).

Table 3-2

Source: WSP

COLLISIONS INVOLVING YOUTHFUL DRIVERS
By First Harmful Event

Type of Collision	Total Collisions		Fatal Collisions		Injury Collisions	
	Number	% of Total	Number	% of Total	Number	% of Total
Collision with other moving motor vehicles	38,493	74.7%	117	47.0%	15,922	72.0%
Collision with parked vehicle	1,772	3.4%	5	2.0%	454	2.1%
Collision with fixed/other object	7,801	15.1%	67	26.9%	3,590	16.2%
Overturning & other non-collision	2,466	4.8%	36	14.5%	1,447	6.5%
Collisions with pedestrians & pedalcyclists	672	1.3%	22	8.8%	648	2.9%
Other collisions - animal & R.R. train	303	0.6%	2	0.8%	66	0.3%
TOTAL	51,507	100.0%	249	100.0%	22,127	100.0%

B. Youthful Collision Involvement By Age Group

The 16- to 20-year-old age group was involved in 17.4% of all collisions. This group's over-representation ratio dropped from 2.41 in 1988 to 2.36 in 1989. However, it is still the highest over-representation ratio for any age group (Figure 3-1). The 21- to 24-year-old age group slightly decreased its over-representation ratio from 1.65 in 1988 to 1.63 in 1989 (Figure 3-2).The 25-29 age group posted an over-representation ratio of 1.24, up from the previous year's 1.24 (Figure 3-3). The 30-54 and 55-year-old-and-older age groups continued to be under-represented in total collisions compared to the groups' percentages of all licensed drivers (Figure 3-4 and 3-5).

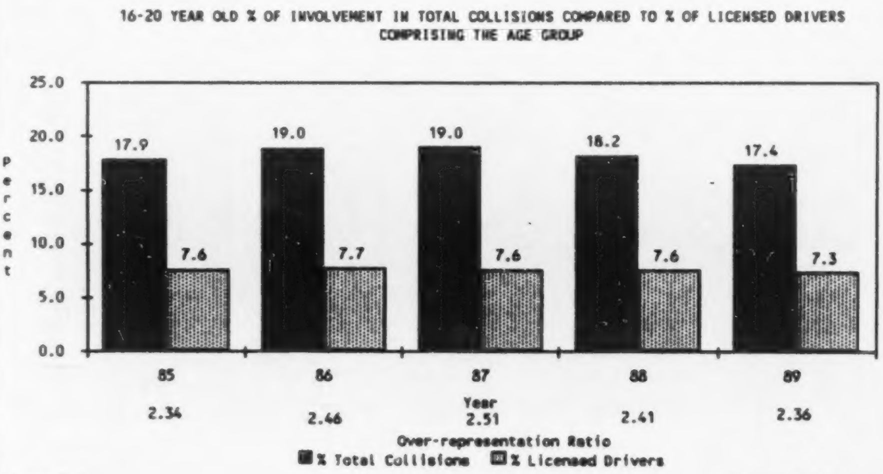

16-20 YEAR OLD % OF INVOLVEMENT IN TOTAL COLLISIONS COMPARED TO % OF LICENSED DRIVERS COMPRISING THE AGE GROUP

Figure 3-1

Source: WSP, DOL

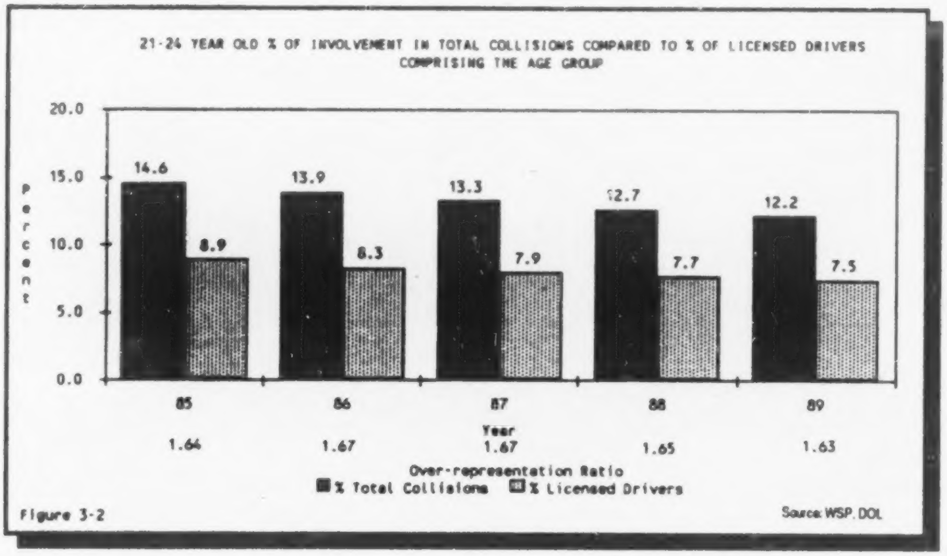


Figure 3-2

Source: WSP, DOL

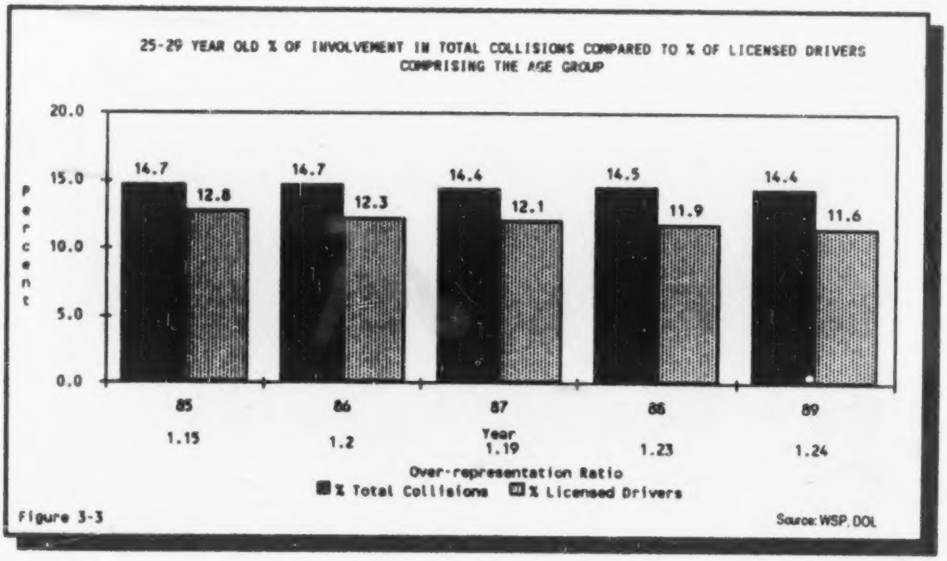
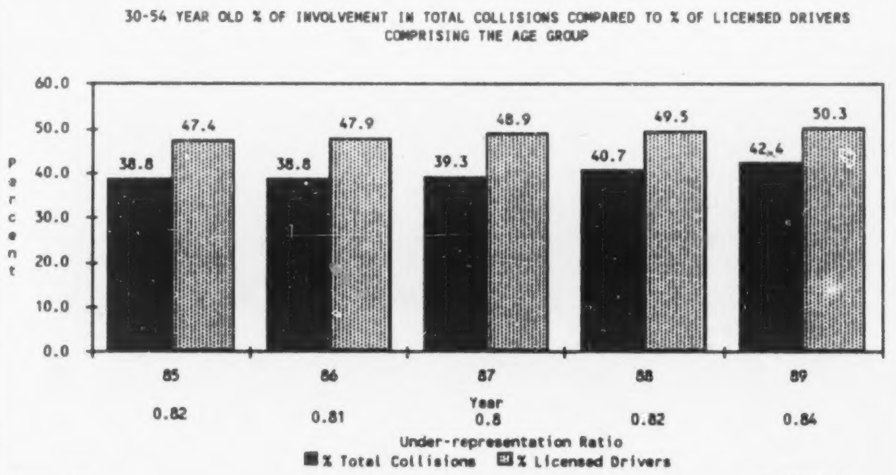


Figure 3-3

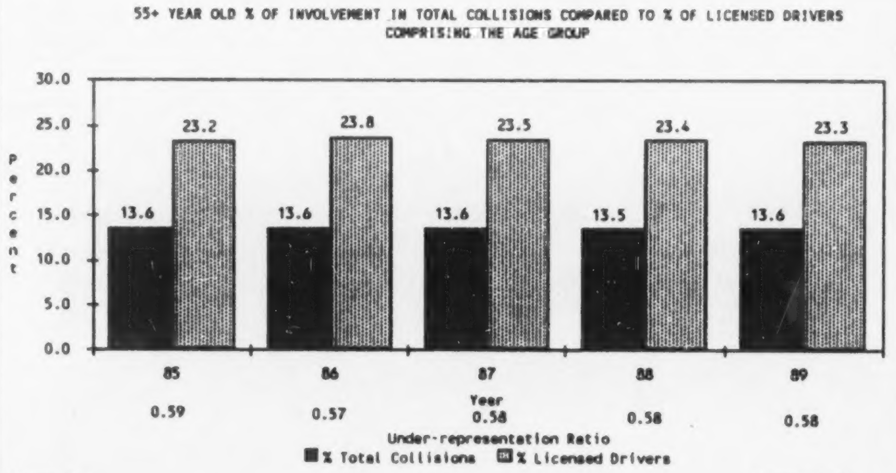
Source: WSP, DOL



30-54 YEAR OLD % OF INVOLVEMENT IN TOTAL COLLISIONS COMPARED TO % OF LICENSED DRIVERS COMPRISING THE AGE GROUP

Figure 3-4

Source: WSP, DOL



55+ YEAR OLD % OF INVOLVEMENT IN TOTAL COLLISIONS COMPARED TO % OF LICENSED DRIVERS COMPRISING THE AGE GROUP

Figure 3-5

Source: WSP, DOL

C. Collision Severity By Area For Youthful Drivers

In 1989, the urban and rural area collision mix remained virtually unchanged, with the urban areas recording 57.4% of collisions involving youthful drivers (24 years old and younger) and the rural areas recording 42.6% (Figure 3-6). Youthful driver injury collisions in urban areas increased slightly to 54.1%, while the rural areas decreased accordingly (Figure 3-7). Youthful driver fatal collisions continued to be far more common in rural areas. In 1989, 80.3% of the fatal collisions involving youthful drivers occurred in rural areas, higher than the 76.8% recorded in 1988 and higher than the 1985-1988 average of 74.4%. The urban areas recorded 19.7% of the fatal crashes, down from 23.7% the year earlier (Figure 3-8).

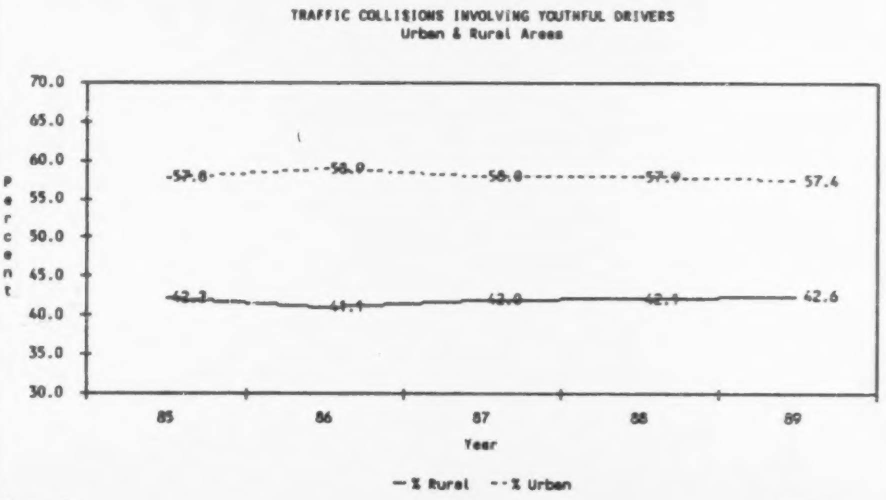


Figure 3-6

Source: WSP

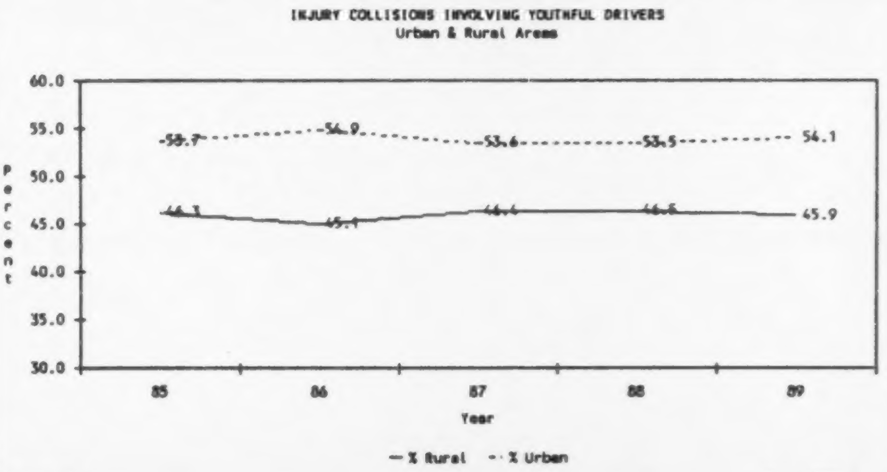


Figure 3-7

Source: WSP

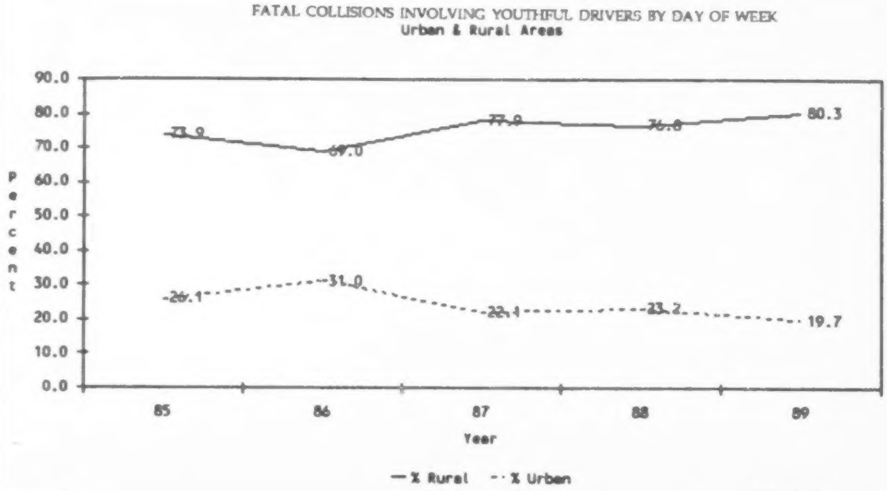


Figure 3-8

Source: WSP

D. Youthful Driver Involvement By Time

In 1989, 25.5% of all the rural fatal collisions involving youthful drivers occurred on Saturday. Sunday had the next highest percentage with 19.5%. The highest frequencies of all reported collisions occurred on Friday and Saturday, each recording 17% of the week's total collisions (Figure 3-9). In urban areas Sunday had the highest occurrence of fatal crashes involving youthful drivers (20.4%). Friday recorded 19.4% of the urban total collisions for 1989, while Monday recorded the fewest collisions (6.1%). Note the significant increases throughout the week, Monday through Sunday, in total urban collisions (Figure 3-10).

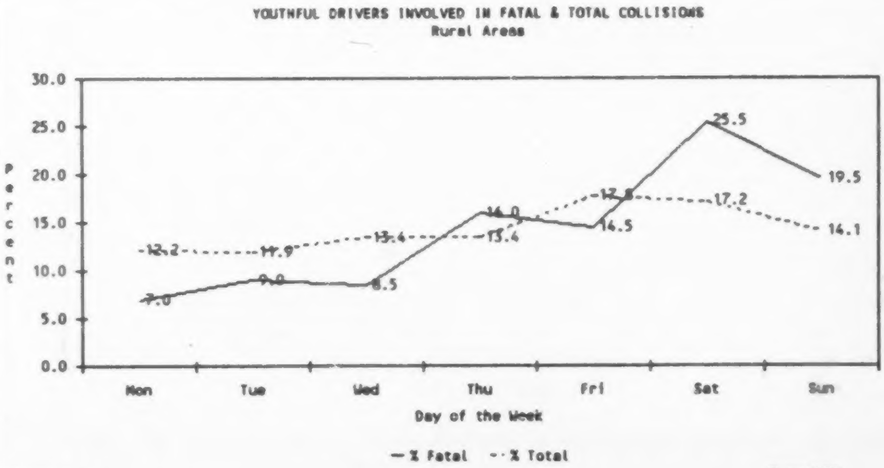


Figure 3-9

Source WSP

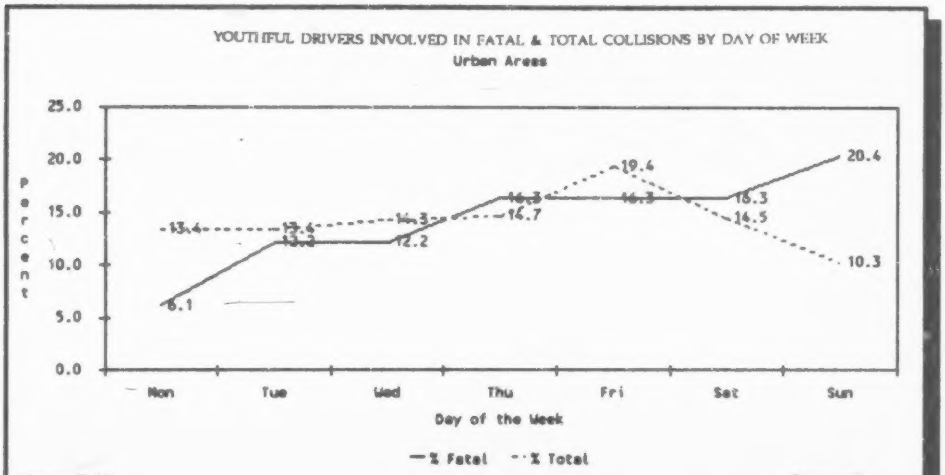


Figure 3-10

Source: WSP

In rural areas, the greatest percentage (19.0%) of youthful driver involvement in fatal collisions occurred from midnight to 3 a.m.. The greatest percentage of total collision involvement (23.9%) for these drivers in rural collisions was from 3 p.m. to 6 p.m. (Figure 3-11). In the urban areas, the greatest youthful involvement by time period in fatal collisions was 24.5% from 9 p.m. to midnight followed by 20.4% in the midnight to 3:00 a.m. time period. The 3 p.m. to 6 p.m. time period recorded 27.4% of the youthful drivers involved in total urban collisions (Figure 3-12).

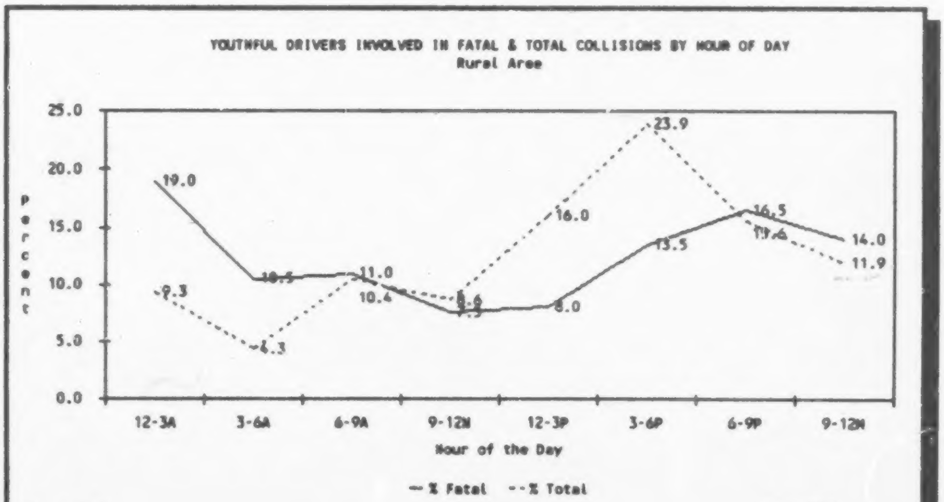


Figure 3-11

Source: WSP

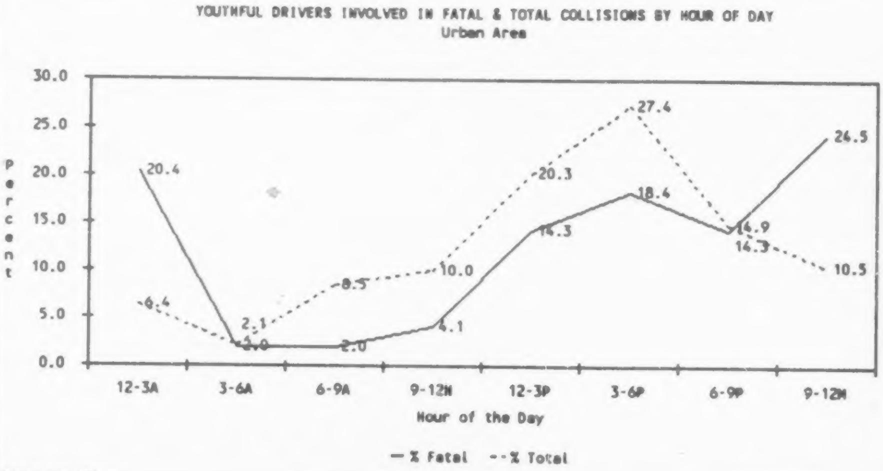

YOUTHFUL DRIVERS INVOLVED IN FATAL & TOTAL COLLISIONS BY HOUR OF DAY
Urban Area

Figure 3-12

Source: WSP

IV. Safety-Restraint Use

Out of a total of 197,394 occupants involved in total investigated collisions, 159,592 were using safety restraints. This is a usage rate of 80.8%, which marks the eighth consecutive year of increases in safety-restraint use since 1981, when the usage rate in investigated collisions was 15.9% (Table 4-1).

Table 4-1

RESTRAINT USAGE RATE
Five-Year Comparison

Status	1989	%	1988	%	1987	%	1986	%	1985	%
Restraints Used	159,592	80.8%	161,667	80.0%	152,413	77.6%	102,751	54.5%	60,392	35.1%
No Restraints Used	37,802	19.2%	40,387	20.0%	44,081	22.4%	85,669	45.5%	111,885	64.9%
TOTAL	197,394	100.0%	202,054	100.0%	196,494	100.0%	188,420	100.0%	172,277	100.0%

Note: Usage rate is the percent of occupants using the restraints among all occupants involved in collisions for whom the usage is known.

Source: WSP

Last year, 395 occupants who were not using any type of restraint died and 2,776 non-restrained occupants were seriously injured. Based on 1989 investigated collision data, it is estimated that an occupant who does not "buckle up" is ten times as likely to be killed and over four and one half times as likely to be seriously injured than one who does "buckle up" (Table 4-2).

Table 4-2

RESTRAINT USAGE & INJURIES SUSTAINED*

Type	Restraints Used		Child Restraints**		No Restraints		Total Occupants	
	Number	%	Number	%	Number	%	Number	%
Deaths	142	0.1%	1	0.0%	395	1.0%	537	0.3%
Disabling Injuries	2,599	1.6%	15	0.6%	2,776	7.3%	5,375	2.7%
Evident Injuries	11,805	7.4%	143	5.3%	7,676	20.3%	19,481	9.9%
Possible Injuries	21,565	13.5%	173	6.4%	5,454	14.4%	27,019	13.7%
No Injuries	123,461	77.4%	2,358	87.7%	21,485	56.9%	144,966	73.4%
TOTAL	159,572	100.0%	2,690	100.0%	37,786	100.0%	197,358	100.0%

*Excludes cases where injury severity was not stated or where restraint use was unknown.

**Included with Restraints Used Category.

Source: WSP

A. Restraint Use by Sex and Age

In 1989 collisions, 86.0% of the female drivers used their restraints, while 81.4% of the male drivers used theirs. Female passengers used restraints at a rate of 79.0% compared to 71.9% for male passengers. The 0-5 age group had the highest restraint use of any age group at 85.8%. The age group with the lowest usage rate was the 16-19 year olds at 74.8%. All age groups showed slight increases in the usage rate, with the exception of the 0-5 age group which recorded a decrease from the previous year (Tables 4-3 and 4-4).

Table 4-3

USAGE RATES BY SEX*
Five-Year Comparison

Occupant	Percent Used Restraints				
	1989	1988	1987	1986	1985
Male Driver	81.4	80.3	77.8	54.0	34.3
Female Driver	86.0	85.5	83.3	59.6	38.8
Male Passenger	71.9	70.9	69.0	46.7	29.4
Female Passenger	79.0	78.5	75.9	55.0	36.0

Source: WSP

*Excludes occupants where restraint use was unknown

Table 4-4

USAGE RATES BY AGE*
Five-Year Comparison

Occupant	Percent Used Restraints				
	1989	1988	1987	1986	1985
Age 0-5	85.8	86.6	85.6	81.0	73.1
Age 6-15	75.3	74.2	72.5	51.5	31.3
Age 16-19	74.8	74.5	71.6	44.2	25.4
Age 20-24	76.4	75.8	72.7	47.5	28.5
Age 25-34	80.6	79.5	77.4	55.3	36.6
Age 35-64	85.8	85.0	82.9	60.6	39.7
Age 65 & Up	85.1	84.5	82.6	58.2	34.7

Source: WSP

*Excludes occupants where restraint use was unknown

Examination of restraint use by occupant age for 1989 reveals that the under one-year-old infant had the highest usage rate at 90.6%. The lowest rate of restraint use (67.6%) was for 15-year-old occupants. Teenage occupants recorded the lowest usage rate of any group with 73.9% (Table 4-5).

Table 4-5

Source WSP, WSDOT

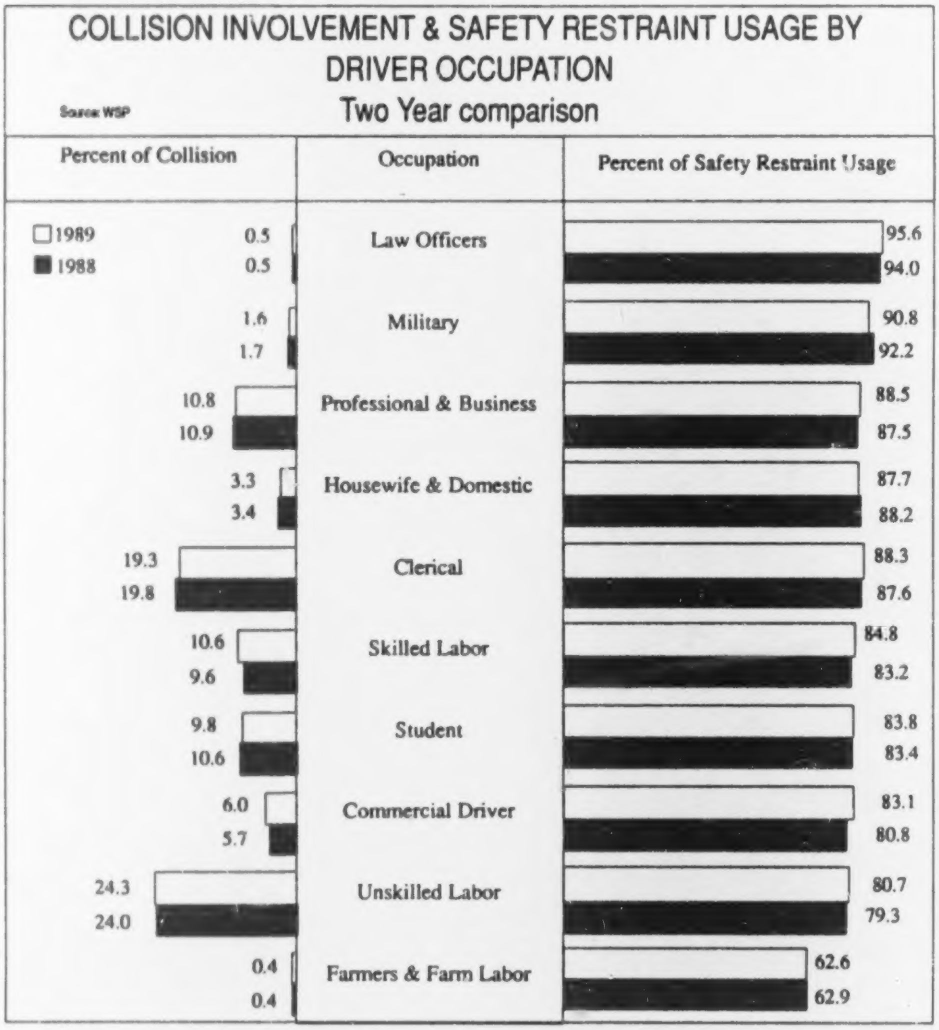
RESTRAINT USAGE
By Occupant Age

	Seat Belt Type					Total Restraints Used		Restraints Not Used	
Age	Lap Belt	Shoulder Belt	Lap & Shoulder Belt	Child Restraint	Air Bag Activated	Number	Percent Used	Number	Percent Not Used
Under 1	33	7	77	492	--	609	90.6%	63	9.4%
1	110	12	131	844	--	1,097	89.6%	127	10.4%
2	323	13	249	533	--	1,118	86.9%	168	13.1%
3	472	17	335	282	--	1,106	85.3%	191	14.7%
4	548	16	448	127	--	1,139	82.3%	245	17.7%
5	431	22	391	53	--	897	81.2%	208	18.8%
6	465	17	378	17	--	877	82.6%	185	17.4%
7	391	19	328	--	--	738	81.4%	169	18.6%
8	391	16	353	--	--	760	80.6%	183	19.4%
9	354	11	319	--	--	684	78.6%	186	21.4%
10	334	15	362	--	--	711	79.4%	185	20.6%
11	299	16	336	--	--	651	79.0%	173	21.0%
12	285	24	360	--	--	669	79.9%	168	20.1%
13	277	21	361	--	--	659	71.6%	262	28.4%
14	337	32	538	--	1	908	68.8%	411	31.2%
15	542	47	1,004	--	2	1,595	67.6%	765	32.4%
16	1,066	168	3,332	--	0	4,566	75.0%	1,525	25.0%
17	1,175	192	4,435	--	1	5,803	75.2%	1,911	24.8%
18	1,236	218	4,824	--	0	6,278	74.5%	2,154	25.5%
19	1,044	206	4,467	--	2	5,717	74.3%	1,975	25.7%
20	904	182	4,085	--	1	5,172	75.0%	1,726	25.0%
21 - 24	2,842	591	13,911	--	5	17,349	76.7%	5,275	23.3%
25 - 29	3,185	591	15,856	--	5	19,637	79.6%	5,030	20.4%
30 - 64	9,930	1,979	53,453	--	23	65,385	84.6%	11,896	15.4%
65 & Over	1,534	411	8,965	--	2	10,912	87.8%	1,519	12.2%
Age Unknown	529	115	2,018	227	0	2,889	76.3%	899	23.7%
TOTAL	29,037	4,956	121,316	2,575	42	157,926	80.8%	37,599	19.2%

B. Restraint Use by Driver Occupation

The usage rate of safety restraints by occupation of driver ranges from a high of 95.6% for law officers to a low of 62.6% for farmers and farm laborers. Usage rates for all occupations with the exception of the military, house wife/domestic, and farmer showed modest increases for 1989 (Figure 4-1).

Figure 4-1

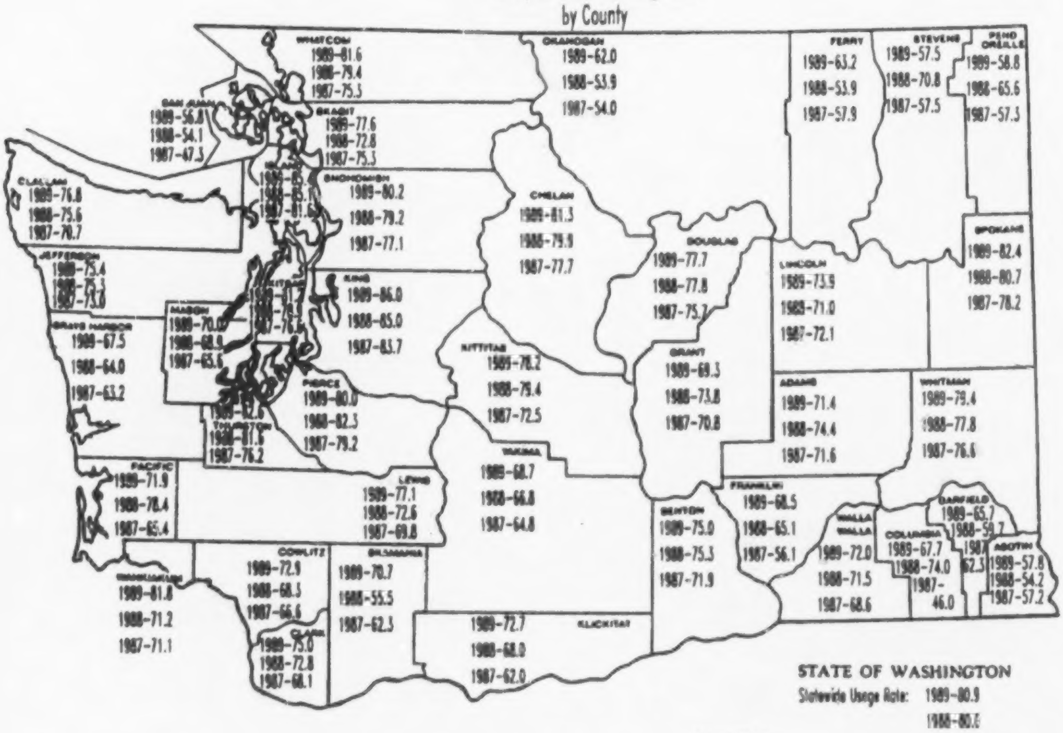


C. Restraint Use by County

A graphic depiction of restraint use by county is presented in Figure 4-2. King County, at 86.0%, had the highest usage rate of all counties in the state in 1989. Island County had the next highest usage rate at 85.4%. The three counties with the lowest usage rate was San Juan, Stevens, and Asotin Counties, recording usage rates of 56.8%, 57.5%, and 57.8% respectively.

Figure 4-2

Occupant Restraint Usage Rate by County


WHATCOM 1989-81.6 1988-79.4 1987-75.3
SAN JUAN 1989-56.8 1988-54.1 1987-47.3
SKAGIT 1989-77.6 1988-72.8 1987-75.3
CLALLAM 1989-76.8 1988-75.6 1987-70.7
SNOHOMISH 1989-80.2 1988-79.2 1987-77.1
JEFFERSON 1989-75.4 1988-75.3 1987-73.8
KING 1989-86.0 1988-85.0 1987-83.7
MASON 1989-70.0 1988-68.9 1987-65.6
GRAYS HARBOR 1989-67.5 1988-64.0 1987-63.2
PIERCE 1989-80.0 1988-82.3 1987-79.2
THURSTON 1987-76.2
PACIFIC 1989-71.9 1988-70.4 1987-65.4
LEWIS 1989-77.1 1988-72.6 1987-69.8
WAHKIAKUM 1989-81.8 1988-71.2 1987-71.1
COWLITZ 1989-72.9 1988-68.3 1987-66.6
CLARK 1989-75.0 1988-72.8 1987-68.1
SKAMANIA 1989-70.7 1988-55.5 1987-62.3
OKANOGAN 1989-62.0 1988-53.9 1987-54.0
FERRY 1989-63.2 1988-53.9 1987-57.9
STEVENS 1989-57.5 1988-70.8 1987-57.5
PEND OREILLE 1989-58.8 1988-65.6 1987-57.3
CHELAN 1989-81.3 1988-79.9 1987-77.7
DOUGLAS 1989-77.7 1988-77.8 1987-75.2
LINCOLN 1989-73.9 1988-71.0 1987-72.1
SPOKANE 1989-82.4 1988-80.7 1987-78.2
KITTITAS 1989-78.2 1988-79.4 1987-72.5
GRANT 1989-69.3 1988-73.8 1987-70.8
ADAMS 1989-71.4 1988-74.4 1987-71.6
WHITMAN 1989-79.4 1988-77.8 1987-76.6
YAKIMA 1989-68.7 1988-66.8 1987-64.8
BENTON 1989-75.0 1988-75.3 1987-71.9
FRANKLIN 1989-68.5 1988-65.1 1987-56.1
WALLA WALLA 1989-72.0 1988-71.5 1987-68.6
COLUMBIA 1989-67.7 1988-74.0 1987-46.0
GARFIELD 1989-65.7 1988-59.7 1987-62.3
ASOTIN 1989-57.8 1988-54.2 1987-57.2
KLICKITAT 1989-72.7 1988-68.0 1987-62.0
STATE OF WASHINGTON
Statewide Usage Rate: 1989-80.9
1987-77.6

Source: WSP

D. Restraint Use by Road and Vehicle Type

Freeway travel (interstates) had the highest usage rate by vehicle occupants at 87.0%. Occupants of vehicles traveling on all other roadways, including forest service roads and recreational roads that are open to the public, recorded the lowest usage rate at 60.9%. The Occupant usage rate in 1989 increased on all types of roadways, with the exception of the "All Other Roadway" category which recorded a 3.1% decrease (Table 4-6).

Table 4-6

Source: WSP, WSDOT

RESTRAINT USAGE
By Functional Class of Roadway

Functional Class	1989	1988	1987	1986	1985
Interstate	87.0%	86.5%	84.6%	66.8%	49.6%
Other state routes	81.5%	79.8%	82.0%	56.0%	34.9%
County Roads	75.9%	75.0%	72.5%	50.5%	31.6%
City Streets	81.5%	80.7%	77.9%	52.6%	32.1%
All others	60.9%	64.0%	63.6%	41.8%	29.7%

Examination of safety-restraint use by vehicle type reveals modest increases in usage rates for all types of vehicles. Passenger cars recorded the highest usage rate at 82.1%. The classification of all other vehicles recorded the lowest rate at 73.2%. However, this group showed the largest increase of restraint use in 1989 (Table 4-7).

Table 4-7

Source: WSP, WSDOT

RESTRAINT USAGE RATE BY TYPE OF VEHICLE DRIVERS
Five-Year Comparison

Type of Vehicle	1989	1988	1987	1986	1985
Passenger car	82.1%	81.6%	78.9%	56.6%	36.8%
Light Trucks	78.0%	76.2%	73.1%	48.8%	29.8%
Heavy Trucks	75.8%	71.7%	67.7%	49.9%	27.3%
All others	73.2%	68.3%	69.5%	52.9%	34.6%

In 1989, 94.3% of the occupants were using safety restraints in "other government (federal agency) registered vehicles" involved in collisions. The next highest usage rate was the 87.4% reported for "municipal government registered vehicles." Occupants of county registered vehicles had the lowest usage rate of occupants in all government owned vehicles at 80.7%. Usage rates by occupants of state-registered vehicles was lower in 1989 (81.0%) than in the previous year (87.8%), but this was the only group that recorded a decrease (Table 4-8).

Table 4-8

Source: WSP, WSDOT

RESTRAINT USAGE RATE BY TYPE OF GOVERNMENT VEHICLE
Five-Year Comparison

Type of Government Vehicle	1989	1988	1987	1986	1985
State registered vehicles	81.0%	87.8%	93.8%	76.3%	77.4%
County registered vehicles	80.7%	75.8%	78.2%	63.8%	49.5%
Municipal registered vehicles	87.4%	79.4%	85.9%	66.3%	49.9%
Other government registered vehicles	94.3%	93.8%	87.6%	84.1%	68.3%

E. Usage Rate by Proximity

Drivers residing within 15 miles of the collision scene recorded the lowest safety-restraint usage rate at 82.7%. Drivers residing in another state recorded the highest usage rate, 85.4%. All categories continued to record increases in restraint usage over previous years (Table 4-9).

Table 4-9

Source: WSP, WSDOT

RESTRAINT USAGE RATE BY PROXIMITY OF DRIVER RESIDENCE
Five-Year Comparison

Residence Proximity	1989	1988	1987	1986	1985
Resided within 15 miles of collision	82.7%	81.9%	79.7%	55.5%	35.3%
Resided over 15 miles	84.4%	84.0%	80.4%	58.1%	38.9%
Residing in other state	85.6%	83.4%	79.1%	60.0%	41.3%

F. Restraint Use by Seat Position

An examination of restraint usage by seat position reveals that drivers were the most frequent users at 82.9%. Occupants in the left-back and right-back positions were the next most frequent restraint users at 78.4%. Occupants riding in the mid-front used restraints the least at 57.0% (Table 4-10).

Table 4-10

Source: WSP, WSDOT

RESTRAINT USAGE RATE BY OCCUPANT SEAT POSITION
Five-Year Comparison

Occupants	1989	1988	1987	1986	1985
Driver	82.9%	82.1%	79.7%	55.9%	35.8%
Mid-front	57.0%	54.8%	51.8%	34.0%	21.2%
Right-front	78.3%	78.0%	74.9%	51.9%	31.9%
Left-back	78.4%	77.7%	74.9%	58.1%	42.6%
Mid-back	68.9%	66.7%	62.4%	44.4%	33.3%
Right-back	78.4%	77.8%	74.1%	58.0%	40.8%
Other	31.6%	29.0%	28.8%	21.5%	20.3%
TOTAL	80.9%	80.1%	77.6%	54.5%	35.1%

Table 4-11 presents 1989 restraint usage by occupant age and seat position. Children aged 0-4 sitting in the right-back and left-back seats recorded the highest usage rate at 92.9% and 91.8% respectively. The 5-9 age group also used safety-restraints most frequently in the left-back (89.3%) and right-front (84.7%) seat positions. The seat position with the lowest reported usage rate for younger groups (20 and under) was the mid-front seat, while the lowest reported usage rate for occupants 21 years of age and older were in the mid-back position. The driver continued to "buckle up" more than any other occupant for those aged 15 through 64. The right-front occupant was the most frequent restraint user at 89.2% in the 65 and over age group.

Table 4-11

Source: WSP, WSDOT

RESTRAINT USAGE RATE
By Occupant Age & Seat Position

	Age							
Seat Position	0-4	5-9	10-14	15-20	21-24	25-29	30-64	65 & Over
Driver	-	-	-	82.8	79.1	81.3	85.1	87.7
Mid-front	76.2	68.6	55.8	45.1	49.7	50.6	58.7	80.8
Right-front	86.2	84.7	78.3	72.5	72.5	76.0	81.9	89.2
Left-back	91.8	89.3	80.2	64.1	65.4	65.5	72.4	88.8
Mid-back	89.0	73.3	70.7	51.1	43.0	46.3	49.1	71.0
Right-back	92.9	84.2	82.8	66.5	66.8	70.8	75.3	83.4
Other	42.5	42.9	38.6	17.6	20.6	7.3	26.1	58.8
Seat location unknown	68.0	66.5	48.7	57.1	43.9	49.2	50.6	28.6

F. Restraint Use by Severity of Collision

A more detailed breakdown of types of restraints used by injury severity is presented for 1989 in Table 4-12. Of 537 occupants killed in vehicle collisions, 395 (73.6%) were not using restraints. Of the 5,375 persons sustaining disabling injuries by collisions, 51.6% were using no restraints. No injuries were reported in investigated collisions for 65.0% of the occupants who were restrained with the combination lap/shoulder belts, an increase from the 62.2% reported for 1988 and 57.9% reported for 1987.

Table 4-12

TYPES OF RESTRAINTS USED
By Severity of Injury

	Number Used		Deaths		Disabling Injury		Evident Injury		Possible Injury		No Injury	
Type	Number	%	Number	%	Number	%	Number	%	Number	%	Number	%
Lap Belt	29,205	14.8%	18	3.4%	474	8.8%	2,450	12.6%	3,414	12.6%	22,849	15.8%
Shoulder Belt	4,983	2.5%	1	0.2%	100	1.9%	352	1.8%	581	2.2%	3,949	2.7%
Lap & Shoulder Belt	122,648	62.1%	121	22.5%	2,006	37.3%	8,850	45.4%	17,389	64.4%	94,282	65.0%
Child Restraint	2,693	1.4%	1	0.2%	15	0.3%	143	0.7%	176	0.7%	2,358	1.6%
Air Bag (Activated)*	43	0.0%	1	0.2%	4	0.1%	10	0.1%	5	0.0%	23	0.0%
No Restraints	37,786	19.1%	395	73.6%	2,776	51.6%	7,676	39.4%	5,454	20.2%	21,485	14.8%
TOTAL OCCUPANTS	197,358	100.0%	537	100.0%	5,375	100.0%	19,481	100.0%	27,019	100.0%	144,946	100.0%

*Less than 1/10 of 1 percent

Source: WSP

Of all collision-involved drivers in 1989, those who had been drinking displayed a greater tendency not to use restraints than those drivers who had not been drinking. The latter category revealed a restraint-usage rate of 86.1% compared to a usage rate of 46.5% for drivers under the influence and 54.3% for drivers who had been drinking intoxicating liquor (Figure 4-3).

Source: WSP, WSDOT

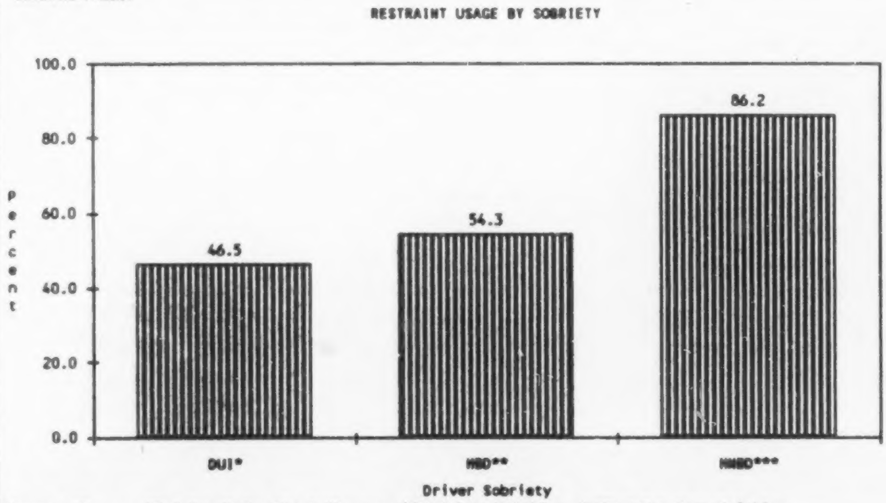


Figure 4-3 *Driving Under the Influence **Had Been Drinking ***Had Not Been Drinking

G. Measuring Restraint Use

Historically, restraint usage rates in this state have been calculated and reported based on collision data supplied by investigating enforcement agencies. This data is accurate when based on direct observation by the investigating officer. In some cases, however, the officer must rely on statements of those actually involved in the collision. Since Washington has a mandatory seat belt use law, the human tendency to report compliance with the law (when, in fact, no belt was worn) artificially inflates the usage rate.

Direct observation of seat belt use has become the method of choice among many state and national highway safety agencies. However, because of difficulties in viewing belt use, these rates tend to be artificially low. They are nevertheless considered by national safety leaders to be more accurate than rates based on reported collision data. National goals, such as a 70% usage rate by 1992, are based on observational studies.

Washington State's seat belt usage rate based on investigated collisions is about 80%, while the state's rate based on observational studies is less than 60%. The WTSC will combine its use of observational studies with investigated collision reports in coming years, and will do research into converting to a uniform data base.

V. Motorcycle Collisions

Motorcycle fatal collisions decreased 13.0% in 1989 when compared to the previous four-year baseline average, and 0.3% from the previous year. Total reported collisions decreased at even a greater rate, recording a 24.7% decrease from the baseline average. Registration in 1989 totaled 110,617 motorcycles, a decrease of 9.6% from the baseline period. The motorcycle collision rate of 2.27 for 1989 was down 16.5% from the baseline rate of 2.72 motorcycle collisions per every 100 registered (Table 5-1).

Table 5-1

MOTORCYCLE COLLISIONS SUMMARY
Five-Year Comparison

Collision Severity/Exposure & Rates	Year					Previous 4-Year Average	% of Change 89 - 4-Year Average
	1989	1988	1987	1986	1985		
Total Collisions	2,516	2,773	3,379	3,508	3,699	3,340	-24.67%
Fatal Collisions	70	72	88	80	82	81	-13.04%
Fatal Collision Ratio*	27.8	26.0	26.0	22.8	22.2	24.2	14.75%
Motorcycle Registration	110,617	117,155	124,215	122,751	125,224	122,336	-9.58%
Total Collision Registration Rate**	2.27	2.37	2.72	2.86	2.95	2.72	-16.52%
Fatal Registration Rate***	0.633	0.615	0.708	0.652	0.655	0.657	-3.74%
Total Persons Killed	75	77	90	81	85	83	-9.91%
Total Persons Injured	2,724	2,896	3,497	3,673	3,884	3,488	-21.89%
Motorcycle Drivers Killed	59	66	86	71	75	75	-20.81%
Motorcycle Drivers Injured	2,119	2,320	2,729	2,909	3,054	2,753	-23.03%
Motorcycle Passengers Killed	10	10	3	9	7	7	37.93%
Motorcycle Passengers Injured	392	383	513	518	577	498	-21.25%

Source: WSP, DOL

*Fatal Collisions per 1,000 motorcycle collisions
**Motorcycle involved per 100 registered
***Fatal Collisions per 1,000 motorcycles registered

A. Motorcycle Collisions By Age Group

The 16- to 29-year-old motorcycle rider continues to be over-represented in the accident population compared to the percentage of licensed motorcycle drivers comprising that age group. The 16-18 year olds were involved in 9.6% of the total collisions, but comprise less than 1% of the motorcycle-endorsed drivers. The 25- to 29-year-old motorcycle riders were involved in the largest percentage of fatal, injury, and total reported collisions (22.2%, 18.7%, and 19.0% respectively). However, they made up only 13.2% of the licensed operators with motorcycle endorsements. From age 30 on up, motorcycle riders are under-represented (Table 5-2).

Table 5-2

Source WSP, DOL

MOTORCYCLE DRIVERS
Comparison of Collisions to Licensed Drivers

Age	Fatal Collisions		Injury Collisions		Total Collisions		% of Endorsed Drivers	Over/Under Ratio in Total Collisions
	Number	%	Number	%	Number	%		
Under 16	0	0.0%	35	1.6%	37	1.5%	0.00	---
16	2	2.8%	32	1.5%	37	1.5%	0.03	51.54
17-18	2	2.8%	159	7.4%	170	7.1%	0.43	16.52
19-20	9	12.5%	268	12.6%	299	12.5%	1.53	8.17
21-22	9	12.5%	221	10.4%	258	10.8%	2.49	4.33
23-24	4	5.6%	204	9.6%	228	9.5%	3.21	2.97
25-29	16	22.2%	400	18.7%	454	19.0%	13.18	1.44
30-34	14	19.4%	289	13.5%	322	13.5%	19.54	0.69
35-39	5	6.9%	207	9.7%	222	9.3%	19.90	0.47
40-44	4	5.6%	126	5.9%	149	6.2%	14.55	0.43
45-54	4	5.6%	134	6.3%	150	6.3%	14.80	0.42
55-64	2	2.8%	37	1.7%	40	1.7%	6.95	0.24
65 & over	1	1.4%	23	1.1%	27	1.1%	3.40	0.33

B. Motorcycle Collisions By Location

Table 5-3 displays a breakdown of motorcycle collision data totals for urban and rural areas as well as statewide for 1989 and 1988. In 1989, rural areas again led urban areas in the total number of fatal collisions, 47 to 23, while urban areas led rural areas in total number of injury collisions, 1,206 to 965. The urban areas of the state recorded a reduction of 5 in the number of motorcyclists killed, down 17.9% from the 28 killed in 1988. Motorcyclist injuries in the urban area increased by 4, while the number of rural injuries dropped 261, or 18.7%, from the previous year.

Table 5-3

Source WSP

MOTORCYCLE COLLISIONS BY LOCATION
Two-Year Comparison

Severity of Collision	1989			1988		
	Urban	Rural	Statewide	Urban	Rural	Statewide
Total Collisions	1,417	1,099	2,516	1,468	1,305	2,773
Fatal Collisions	23	47	70	25	47	72
Injury Collisions	1,206	965	2,171	1,247	1,146	2,393
Property-damage-only Collisions	188	87	275	196	112	308
Total Fatalities	25	50	75	28	49	77
All Persons Injured	1,485	1,239	2,724	1,481	1,415	2,896
Motorcyclists Killed	23	46	69	28	49	77
Motorcyclists Injured	1,376	1,135	2,511	1,396	1,341	2,737

A further breakdown of 1989 motorcycle collisions by road type indicates that 53.5% of the total collisions, 52.6% of the injury collisions, and 30.02% of the fatal collisions occurred on city streets. County roads accounted for 50% of the fatal collisions and 26.4% each of the injury collisions and the total collisions. All state routes (interstates, U.S. and state routes) recorded 11.4% of the fatal, 19.5% of the injury and 18.8% of the total reported motorcycle collisions (Table 5-4).

Table 5-4

MOTORCYCLE COLLISIONS
By Location

Location	Collisions				Persons	
	Total	Fatal	Injury	P.D. Only*	Killed	Injured
Interstate System	171	6	148	17	6	180
U.S. Route No.**	52	2	48	2	2	74
State Route No.**	249	6	227	16	6	294
County Roads	664	35	574	55	38	730
City Streets***	1,347	21	1,143	183	23	1,410
Other Traffic Ways	33	0	31	2	0	36
Total	2,516	70	2,171	275	75	2,724

Source: WSP

*Property Damage Only
**Excluding city streets
***Including U.S. and State Routes in cities

Total frequency of motorcycle collisions occurring on city streets, county roads, and all state routes decreased during 1989. This continues a four-year trend. Motorcycle collisions occurring on state routes continued a downward trend, with an eight-year low of 472 collisions in 1989. County roads also recorded an eight-year low after slight increases in 1985 and 1987 (Figure 5-1).

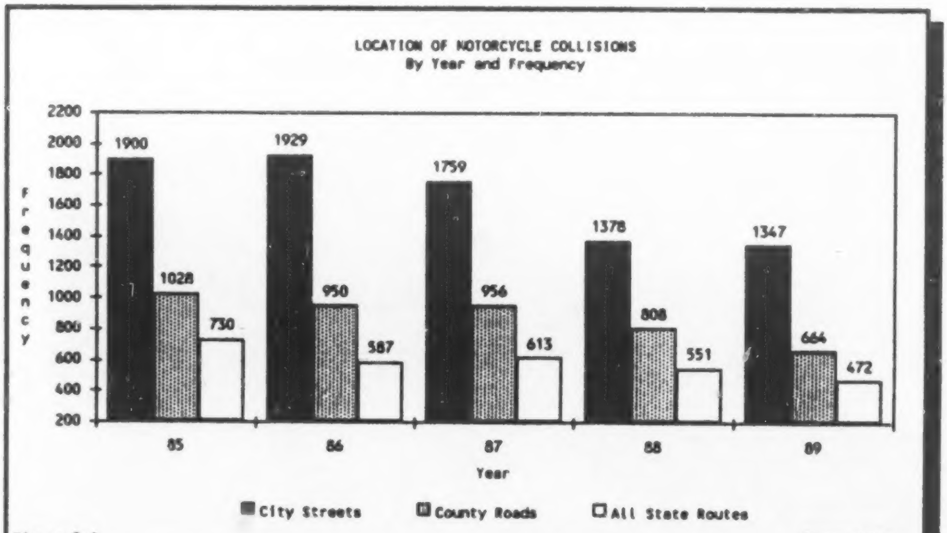


Figure 5-1

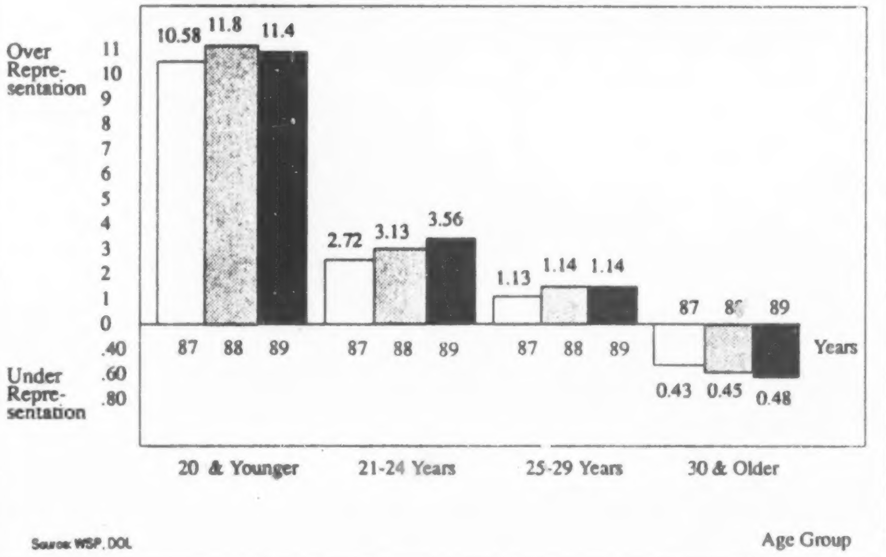
Source: WSP

C. Over/Under Representation of Motorcycle Drivers by Age

Figure 5-2 shows that motorcycle riders under 29 years of age, particularly those 20 years old and younger, continue to be over-represented in total motorcycle collision involvement when compared to the percentages of licensed motorcycle riders comprising their age group. The 30-year-old and over age group continues to be under-represented.

Figure 5-2

COMPARISON OF MOTORCYCLE DRIVER OVER/UNDER REPRESENTATION COLLISIONS TO MOTORCYCLE ENDORSEMENT BY AGE GROUP



Source: WSP, DOL

Speed too fast for conditions caused most of the motorcycle collisions for all age groups contributing to 24.1% of the year's motorcycle violations and was the prominent driver violation in all age groups. Driving while intoxicated was the second most prominent violation, contributing 15.4% to total motorcycle driver violations. Motorcyclists driving over the speed limit was the third leading violation, contributing to 13.2% of the violation total (Table 5-5).

Table 5-5

MOTORCYCLIST VIOLATIONS BY AGE
Investigated Collisions Only

	Violations		Age of Violator							Number Not
Violation	Total	%	20 & Under	21-24	25-29	30-34	35-44	45-54	55 & Over	Stated
Speed - Conditions	443	24.1%	111	93	83	64	50	18	12	12
Speed - Over Legal	242	13.2%	77	68	43	26	18	5	1	4
Failed to Yield	100	5.4%	37	15	18	7	11	4	2	6
D.W.I.	284	15.4%	44	55	74	55	42	9	1	4
Following Too Closely	128	7.0%	33	22	22	14	18	7	7	5
Improper Passing	122	6.6%	28	29	23	11	17	4	2	8
Operating Defective Equipment	58	3.2%	11	13	4	8	8	11	1	2
Disregard Signs/Signals	68	3.7%	20	17	12	5	10	2	1	1
Over Centerline	48	2.6%	15	11	10	7	3	1	0	1
Other Violations	346	18.8%	77	62	49	42	59	27	15	15
Total	1,839	100.0%	453	385	338	239	236	88	42	58

Source: WSP

D. Motorcycle Collisions By First Harmful Event

The most common first harmful event causing collisions involving a single motorcycle was overturning. This cause predominated for all age groups. In multiple vehicle collisions involving motorcycles, the rear-end collision was most prevalent (15.3%). Angular collisions constituted the next most common event (13.8%) in multiple vehicle motorcycle collisions. Collisions occurring while entering or leaving a driveway contributed to 12.2% of all motorcycle collisions. (Table 5-6).

Table 5-6

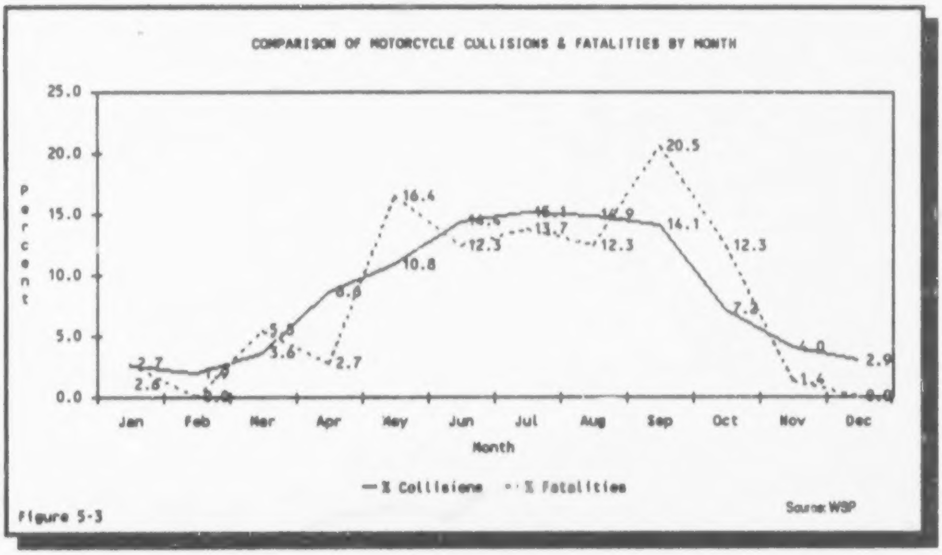
Source: WSP

MOTORCYCLISTS INVOLVED IN TRAFFIC COLLISIONS
By First Harmful Event

	Collisions		Age of Motorcyclist						
Type of Collision	Total	%	20 & Under	21-24	25-29	30-34	35-44	45-54	55 & Over
Single Motorcycle Collision									
Struck Fixed Object	255	10.7%	58	59	46	43	39	7	3
Struck Other Object	13	0.5%	2	2	5	1	3	0	0
Overturned	601	25.1%	123	119	113	85	90	48	23
Motorcycle-Pedestrian	15	0.6%	4	4	0	4	1	1	1
Motorcycle-R.R. Train	1	0.0%	0	0	0	1	0	0	0
Motorcycle-Pedalcyclist	11	0.5%	3	1	1	1	2	1	2
Motorcycle-Animal	38	1.6%	7	7	5	7	10	1	1
Non-Collision	24	1.0%	10	3	3	5	3	0	0
Total Single Motorcycle Collisions	958	40.0%	207	195	173	147	148	58	30
Multiple Vehicle Collision									
Head-on	30	1.3%	10	8	4	2	3	2	1
Rear-end	367	15.3%	84	75	72	46	51	28	11
Sideswipe	128	5.3%	25	17	30	20	25	6	5
Angular Direction	331	13.8%	85	78	59	37	49	18	5
Enter/Leave Driveway	292	12.2%	79	61	51	32	48	16	5
One Left/One Straight-Opp. Dir.	204	8.5%	34	38	43	32	36	14	7
Other Multiple Vehicle Collision	83	3.5%	19	16	22	6	11	8	3
Total Multiple Vehicle Collisions	1,435	60.0%	336	291	281	175	223	92	37
TOTAL MOTORCYCLE COLLISIONS	2,393	100.0%	543	486	454	322	371	150	67

E. Time of Motorcycle Collision Occurrence

As one would expect, the milder weather months (June-September) of 1989 recorded the greatest percentage of motorcycle collisions. The highest frequency of fatalities occurred May through October (Figure 5-3).

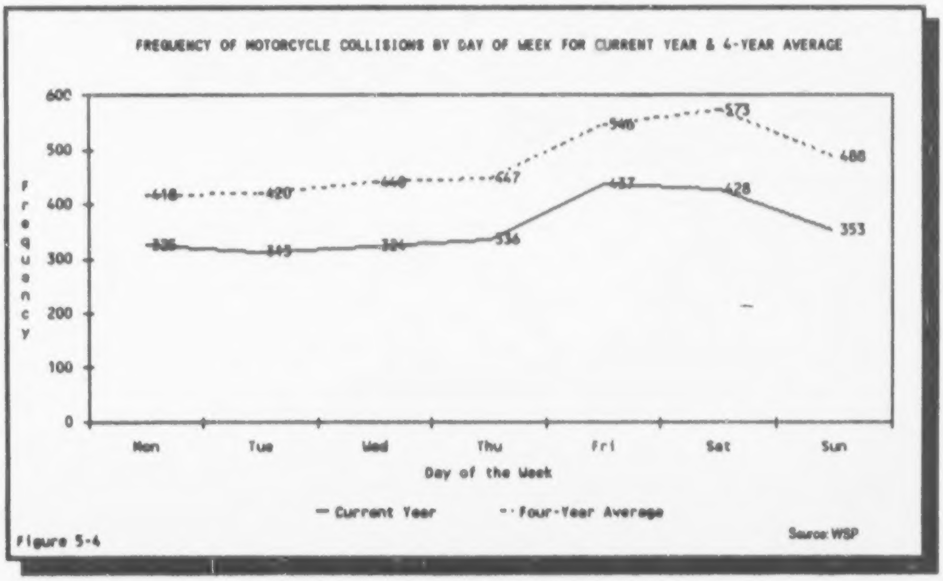


COMPARISON OF MOTORCYCLE COLLISIONS & FATALITIES BY MONTH

Figure 5-3

Source: WSP

Friday and Saturday experience the greatest numbers of motorcycle collisions compared to other days of the week. This has been consistent throughout the four-year baseline period and continued in 1989 as well (Figure 5-4).



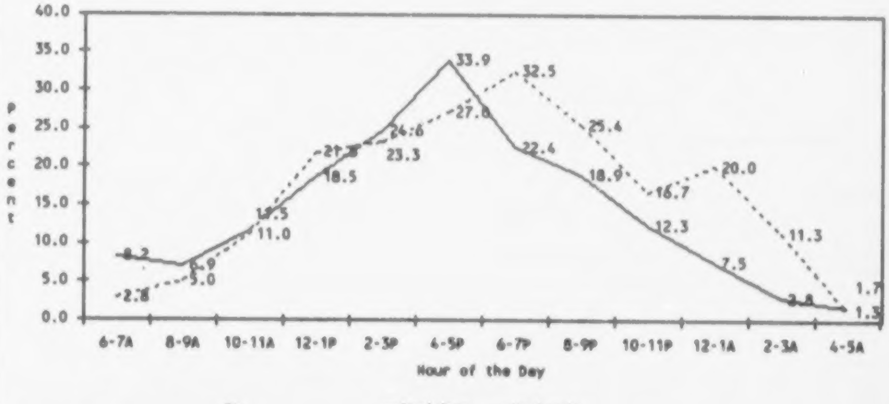
FREQUENCY OF MOTORCYCLE COLLISIONS BY DAY OF WEEK FOR CURRENT YEAR & 4-YEAR AVERAGE

Figure 5-4

Source: WSP

A further breakdown of motorcycle collisions by hour of day in 1989 reveals that the weekday hours from 2 p.m. to 8 p.m. constituted the most dangerous period of the day. The noon to 1 a.m. time frame proved to be the highest risk period for weekend motorcycling (Figure 5-5).

AVERAGE NUMBER OF MOTORCYCLE COLLISIONS BY TWO-HOUR PERIODS ON WEEKDAYS & WEEKENDS*



*6 pm Friday through Midnight Sunday

Figure 5-5

Source WSP

VI. Pedalcycles

Total pedalcycle accidents decreased 9.4% from the previous four-year average in 1989. The number of pedalcyclists killed decreased from 18 deaths in 1987 to 12 in 1988 and 8 in 1989. The 1989 total was down 40.7% from the baseline period. In addition, fewer persons received injuries than the previous year and from the previous four-year average (Table 6-1).

Table 6-1

PEDALCYCLE TRAFFIC COLLISIONS
Five-Year Comparison

Severity	Year					Previous 4 -Year Average	% Change 89 - 4-Year Average
	1989	1988	1987	1986	1985		
Statewide							
Total Collisions	1,303	1,348	1,575	1,507	1,325	1,439	-9.44%
Persons Killed*	8	12	18	12	12	14	-40.74%
Persons Injured*	1,331	1,375	1,584	1,538	1,354	1,463	-9.01%
Rural Areas							
Total Collisions	392	439	550	491	463	486	-19.3%
Persons Killed*	6	6	15	6	9	9	-33.3%
Persons Injured*	402	450	559	510	472	498	-19.2%
Urban Areas		-					
Total Collisions	911	909	1,025	1,016	862	953	-4.4%
Persons Killed*	2	6	3	6	3	5	-55.6%
Persons Injured*	929	925	1,025	1,028	882	965	-3.7%

Source: WSP

*In pedalcycle collisions by first harmful event.

A. Pedalcycle Collisions - Rural/Urban

The rural and urban areas of the state both recorded decreases in pedalcycle collisions. The rural areas recorded the biggest decrease in total collisions and the number of persons injured. The urban areas recorded the largest decrease in the numbers killed (Table 6-1).

In 1989, 69.9% of the pedalcycle collisions occurred in the urban areas of our state, while 30.1% occurred in the rural areas (Figure 6-1).

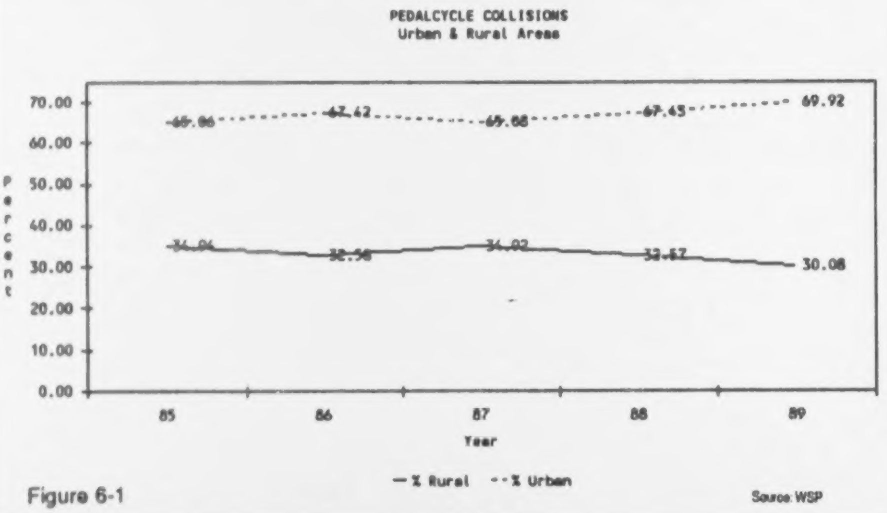


Figure 6-1

Source: WSP

B. Pedalcyclists Killed and Injured - By Age

In 1989, 37.5% of the pedalcyclists killed were in the 5-9 age bracket (Table 6-2).

Table 6-2

Source: WSP

PEDALCYCLISTS KILLED BY AGE
Five-Year Comparison

Age	Year					Previous 4-Year Average	% of Change 89 - 4-Year Average
	1989	1988	1987	1986	1985		
0-4	0	0	0	2	0	1	-100.00%
5-9	3	5	4	2	3	4	-14.29%
10-14	2	2	3	3	2	3	-20.00%
15-19	1	0	2	1	2	1	-20.00%
20-24	0	0	2	1	0	1	-100.00%
25-34	1	2	3	3	1	2	-55.56%
35-44	0	2	1	0	1	1	-100.00%
45-54	1	0	2	0	2	1	0.00%
55-64	0	0	1	0	1	1	-100.00%
65-74	0	1	0	0	0	0	-100.00%
75 & Older	0	0	0	0	0	0	---
Not Stated	0	0	0	0	0	0	---
TOTAL	8	12	18	12	12	14	-40.74%

Pedalcyclists between the ages of 5 to 19 made up 61.4% of the total injured, down from the 65.6% for this group injured in the baseline period (Table 6-3).

Table 6-3

PEDALCYCLISTS INJURED* BY AGE
Five-Year Comparison

Age	Year 1989	1988	1987	1986	1985	Previous 4-Year Average	% of Change 89 - 4-Year Average
0-4	14	23	23	18	31	24	-41.05%
5-9	230	210	284	266	251	253	-9.00%
10-14	353	366	444	443	403	414	-14.73%
15-19	214	253	302	296	241	273	-21.61%
20-24	130	155	155	176	155	160	-18.88%
25-34	184	156	166	170	143	159	15.91%
35-44	69	71	63	56	38	57	21.05%
45-54	30	33	20	18	15	22	39.53%
55-64	14	18	13	12	8	13	9.80%
65-74	7	8	17	7	2	9	-17.65%
75 & Older	3	4	2	2	1	2	33.33%
Not Stated	51	49	63	43	37	48	6.25%
TOTAL	1,299	1,346	1,552	1,507	1,325	1,433	-9.32%

Source: WSP, OFM

* Pedalcyclists injured in all traffic collisions.

C. Persons Killed and Injured in Pedalcycle Collisions by Month

The months of May through September accounted for 73.6% of the persons killed and injured in pedalcycle-related collisions for 1989. (Figure 6-2).

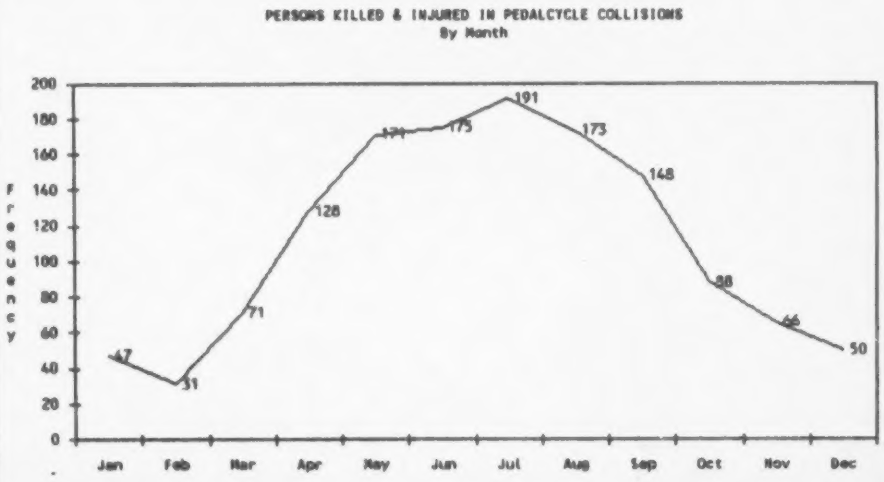


Figure 6-12

Source: WSP

D. Pedalcycle Collision Rate by City Population

The city of Olympia experienced the highest pedalcycle collision rate in the state during 1989, with 74.03 collisions per 100,000 population. Walla Walla recorded the second highest collision rate in the state with 73.96 collisions per 100,000 population, followed by Aberdeen with 64.18 and Pasco with 62.64 (Table 6-4).

Table 6-4

PEDALCYCLE COLLISION RATE BY POPULATION
Cities 15,000 Population & Greater

City	1989 Population	Pedalcycle Deaths		Pedalcycle Injuries		Total Ped Collisions	
		Number	Rate*	Number	Rate*	Number	Rate*
250,000 and Over							
1. Seattle	497,200	0	0.00	254	51.09	245	49.28
100,000 to 250,000							
1. Spokane	358,000	0	0.00	78	21.79	80	22.35
2. Tacoma	162,100	0	0.00	58	35.78	57	35.16
50,000 to 100,000							
1. Bellevue	86,350	0	0.00	42	48.64	42	48.64
2. Everett	64,170	0	0.00	38	59.22	38	59.22
3. Yakima	50,610	0	0.00	23	45.45	20	39.52
25,000 to 50,000							
1. Bellingham	47,290	0	0.00	30	63.44	28	59.21
2. Vancouver	44,450	0	0.00	20	44.99	19	42.74
3. Renton	38,480	0	0.00	12	31.19	12	31.19
4. Bremerton	37,080	0	0.00	19	51.24	19	51.24
5. Kennewick	36,880	0	0.00	8	21.69	8	21.69
6. Kirkland	36,620	0	0.00	3	8.19	4	5.46
7. Kent	34,860	0	0.00	19	54.50	18	51.64
8. Redmond	33,400	0	0.00	12	35.93	12	35.93
9. Auburn	32,460	0	0.00	19	58.53	18	55.45
10. Olympia	31,070	0	0.00	22	70.81	23	74.03
11. Longview	30,320	1	3.30	19	62.66	18	59.37
12. Richland	29,970	0	0.00	5	16.68	5	16.68
13. Edmonds	29,720	1	3.36	11	37.01	12	40.38
14. Lynnwood	26,280	0	0.00	9	34.25	9	34.25
15. Walla Walla	25,690	0	0.00	9	35.03	10	73.96
15,000 to 25,000							
1. Pullman	22,270	0	0.00	4	17.96	4	4.49
2. Puyallup	21,290	0	0.00	8	37.58	8	37.58
3. Mercer Island	20,380	0	0.00	1	4.91	1	39.25
4. Wenatchee	19,950	0	0.00	8	40.10	8	45.11
5. Mountlake Terrace	17,590	0	0.00	2	11.37	2	34.11
6. Pasco	17,560	0	0.00	5	28.47	6	62.64
7. Port Angeles	17,490	0	0.00	9	51.46	9	40.02
8. Aberdeen	17,140	0	0.00	7	40.84	7	64.18
9. Lacey	16,940	0	0.00	11	64.94	11	0.00

*Frequency per 100,000 population

Source: WSP

VII. Pedestrians

One hundred and ten pedestrians were killed in 1989, an increase of 17.9% over the four-year average. Pedestrian injuries also increased 2.4% above the four-year baseline to 1,858. In 1989, pedestrian fatalities in rural areas increased by 19, which is 37.3% over the previous year, and were up by 23, which is 49.7% over the four-year baseline period. Injuries decreased by 4 from the previous year, but increased 14 or 2.9% from the baseline period. Urban pedestrian deaths decreased by 7, or 14.0% from the baseline period while pedestrian injuries increased by 30, or 2.3% (Table 7-1).

Table 7-1

PEDESTRIANS KILLED & INJURED IN VEHICLE COLLISIONS
Five-Year Comparison

Severity by Area	Year					Previous 4 -Year Average	% Change 89- 4-Year Average
	1989	1988	1987	1986	1985		
Statewide							
Pedestrians Killed	110	97	93	94	89	93	17.96%
Pedestrians Injured	1,858	1,820	1,830	1,843	1,763	1,814	2.43%
Rural Areas							
Pedestrians Killed	70	51	39	52	45	47	49.73%
Pedestrians Injured	493	497	468	468	483	479	2.92%
Urban Areas*							
Pedestrians Killed	40	46	54	42	44	47	-13.98%
Pedestrians Injured	1,365	1,323	1,362	1,375	1,280	1,335	2.25%

*2,500 population and greater

Source: WSP

A. Pedestrians Killed And Injured - By Age

In 1989, 13 more pedestrians were killed than the 97 killed in 1988; 18 more died than the four-year baseline average. The number of pedestrians aged 9 years and younger who were killed decreased from 14 in 1988 to 11 in 1989 and remained unchanged from the previous four-year average. The number of 75 and older pedestrians killed increased by two over the previous four-year average (Table 7-2).

The largest percentage increase for pedestrian injuries during 1989 occurred in the 35-44 and the 10-14 age brackets, the former recording a 16.6% increase and the latter a 15.0% increase in comparison to the baseline average (Table 7-3).

Table 7-2

PEDESTRIANS KILLED BY AGE
Five-Year Comparison

Age	Year 1989	1988	1987	1986	1985	Previous 4-Year Average	% of Change 89 - 4-Year Average
0-4	5	10	5	2	3	5	0.00%
5-9	6	4	5	4	11	6	0.00%
10-14	5	3	6	2	3	4	42.86%
15-19	13	10	7	10	3	8	73.33%
20-24	10	3	2	7	5	4	135.29%
25-34	19	15	14	12	11	13	46.15%
35-44	11	12	11	13	9	11	-2.22%
45-54	10	7	11	7	7	8	25.00%
55-64	8	7	11	10	9	9	-13.51%
65-74	5	8	7	8	7	8	-33.33%
75 & Older	18	15	14	14	21	16	12.50%
Not Stated	0	3	0	0	0	1	-100.00%
TOTAL	110	97	93	89	89	92	19.57%

Source: WSP

Table 7-3

PEDESTRIANS INJURED* BY AGE
Five-Year Comparison

Age	Year 1989	1988	1987	1986	1985	Previous 4-Year Average	% of Change 89 - 4-Year Average
0-4	83	97	92	77	83	87	-4.87%
5-9	235	234	251	231	203	230	2.29%
10-14	226	197	196	198	195	197	15.01%
15-19	218	190	206	206	208	203	7.65%
20-24	185	149	166	151	181	162	14.37%
25-34	288	295	289	290	285	290	-0.60%
35-44	219	210	196	176	169	188	16.64%
45-54	95	95	108	111	99	103	-7.99%
55-64	87	96	84	76	90	87	0.58%
65-74	78	74	83	72	92	80	-2.80%
75 & Older	74	91	76	98	82	87	-14.70%
Not Stated	70	92	83	66	76	79	-11.67%
TOTAL	1,858	1,820	1,830	1,752	1,763	1,791	3.73%

Source: WSP

* In all traffic collisions.

B. Pedestrian Collisions By City Population

Table 7-4 presents the 1989 numbers and rates for pedestrian traffic deaths, injuries, and total collisions for cities of 15,000 population or more in Washington. Auburn had the highest rate of pedestrian fatalities at 9.24 per 100,000 population, based on 3 pedestrian deaths. Comparing pedestrian injury rates, Kent had the highest with 100.40, Lynnwood was second with 95.13, and Seattle was a close third with 94.73. Seattle had the highest rate of pedestrian collisions with 93.12 per 100,000 population; Kent was second with 88.93.

Table 7-4

PEDESTRIAN COLLISION RATE BY POPULATION
Cities 15,000 Population & Greater

City	1989 Population	Pedestrian Deaths		Pedestrian Injuries		Total Ped Collision	
		Number	Rate*	Number	Rate*	Number	Rate*
250,000 and Over							
1. Seattle	497,200	12	2.41	471	94.73	463	93.12
100,000 to 250,000							
1. Spokane	170,700	2	1.17	121	70.88	116	67.96
2. Tacoma	162,100	3	1.85	138	85.13	139	85.75
50,000 to 100,000							
1. Bellevue	86,350	0	0.00	38	44.01	36	41.69
2. Everett	64,170	0	0.00	46	71.68	45	70.13
3. Yakima	50,610	0	0.00	43	84.96	38	75.08
25,000 to 50,000							
1. Bellingham	47,290	0	0.00	23	48.64	20	42.29
2. Vancouver	44,450	2	4.50	21	47.24	23	51.74
3. Renton	38,480	1	2.60	15	38.98	13	33.78
4. Bremerton	37,080	1	2.70	27	72.82	28	75.51
5. Kennewick	36,880	1	2.71	8	21.69	7	18.98
6. Kirkland	36,620	1	2.73	15	40.96	12	32.77
7. Kent	34,860	1	2.87	35	100.40	31	88.93
8. Redmond	33,400	0	0.00	12	35.93	10	29.94
9. Auburn	32,460	3	9.24	17	52.37	20	61.61
10. Olympia	31,070	0	0.00	13	41.84	13	41.84
11. Longview	30,320	1	3.30	21	69.26	22	72.56
12. Richland	29,970	0	0.00	5	16.68	5	16.68
13. Edmonds	29,720	0	0.00	10	33.65	10	33.65
14. Lynnwood	26,280	1	3.81	25	95.13	20	76.10
15. Walla Walla	25,690	0	0.00	9	35.03	9	35.03
15,000 to 25,000							
1. Pullman	22,270	1	4.49	6	26.94	6	26.94
2. Puyallup	21,290	0	0.00	9	42.27	9	42.27
3. Mercer Island	20,380	0	0.00	4	19.63	4	19.63
4. Wenatchee	19,950	0	0.00	9	45.11	9	45.11
5. Mountlake Terrace	17,590	0	0.00	7	39.80	6	34.11
6. Pasco	17,560	0	0.00	8	45.56	8	45.56
7. Port Angeles	17,490	1	5.72	12	68.61	12	68.61
8. Aberdeen	17,140	1	5.83	9	52.51	10	58.34
9. Lacey	16,940	0	0.00	5	29.52	5	29.52

Source: WSP, OFM

*Frequency per 100,000 population

C. Actions Of Pedestrians Killed and Injured - Urban and Rural

Thirty-five percent of the pedestrians killed or injured in urban areas in the state were struck while crossing the roadway at an intersection. Another 40.0% were killed or injured while crossing not at an intersection. The largest percentage of pedestrians in these groups were in the 5 to 14 year olds. Nearly two-thirds (63.8% of the pedestrians ages 0-4 were killed or injured while crossing between intersections).

In rural areas, the most frequently involved age group in fatal and injury collisions fell into the 25- to 64-year-old group which accounted for 34.0% of all pedestrians killed or injured in traffic collisions. However, when broken down to single ages, the 5-14 year-olds were the most involved. The most common contributing action of this age group was "crossing, entering roadway not at intersection." Over half (53.4%) of the pedestrians age 5-14 were killed or injured while crossing not at an intersection (Table 7-5).

Table 7-5

Source: WSP

ACTIONS OF PEDESTRIANS KILLED & INJURED
Urban and Rural Areas

Action	Killed		Killed/Injured		Age					Number Not Stated
	Number	%	Number	%	0-4	5-14	15-24	25-64	65+	
Urban:										
Crossing, entering roadway at intersection	14	35.0%	711	50.3%	12	142	153	290	85	29
Not at intersection	16	40.0%	418	29.6%	44	145	64	116	33	16
Walking with traffic	0	0.0%	21	1.5%	0	1	3	11	6	2
Walking against traffic	0	0.0%	10	0.7%	0	0	6	4	0	0
Standing or working in roadway	2	5.0%	72	5.1%	1	3	17	49	0	2
Playing in roadway	0	0.0%	27	1.9%	8	15	4	0	0	0
Lying in roadway	3	7.5%	6	0.4%	0	1	0	5	0	0
Not in roadway	4	10.0%	78	5.5%	2	12	19	40	5	0
Other & Not Stated	1	2.5%	71	5.0%	2	9	17	36	3	4
TOTAL URBAN	40	100.0%	1,414	100.0%	69	328	283	551	130	53
% of Total Killed or Injured					4.9%	23.2%	20.0%	39.0%	9.2%	3.7%
Rural:										
Crossing, entering roadway at intersection	9	12.9%	122	21.6%	4	32	26	38	17	5
Not at intersection	22	31.4%	190	33.6%	9	78	34	52	15	2
Walking with traffic	11	15.7%	27	4.8%	1	2	9	13	2	0
Walking against traffic	6	8.6%	16	2.8%	0	3	3	8	2	0
Standing or working in roadway	7	10.0%	44	7.8%	0	2	15	25	1	1
Playing in roadway	2	2.9%	25	4.4%	5	13	6	0	0	1
Lying in roadway	1	1.4%	1	0.2%	0	0	1	0	0	0
Not in roadway	10	14.3%	98	17.3%	0	12	36	40	7	3
Other & Not Stated	2	2.9%	42	7.4%	2	4	14	16	1	5
TOTAL RURAL	70	100.0%	565	100.0%	21	146	144	192	45	17
% of Total Killed or Injured					3.7%	25.8%	25.5%	34.0%	8.0%	3.0%

D. Pedestrian Collisions By Day Of Week and Hour Of Day

In 1989, Friday and Thursday were the two days with the highest frequency of pedestrian fatalities, recording 24.3% and 18.9% deaths respectively. Friday also recorded the highest number of reported pedestrian collisions (Figure 7-1). The 6 p.m. to 9 p.m. time period evidenced the greatest percentage of fatal pedestrian collisions at 32.4%. The 3 p.m. to 6 p.m. recorded the greatest number of reported pedestrian collisions at 29.8% (Figure 7-2).

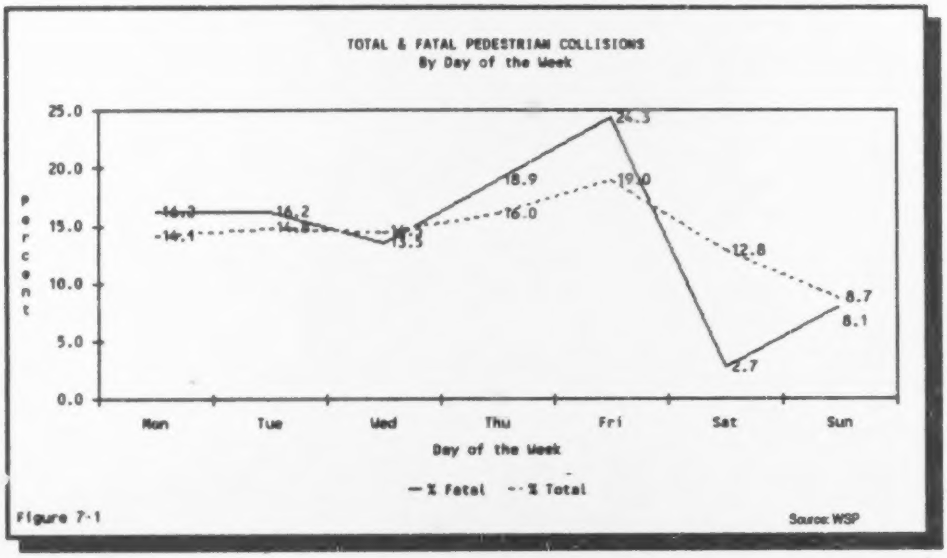


Figure 7-1

Source: WSP

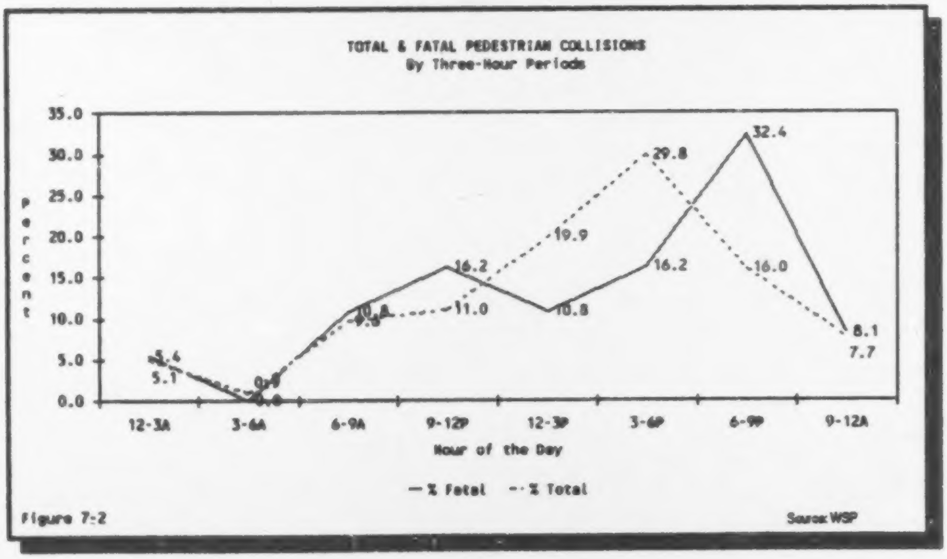


Figure 7-2

Source: WSP

VIII. Heavy Trucks

In 1989, 6,345 heavy trucks were involved in collisions, for an 12.4% decrease over the four-year baseline. Registrations in 1989 totaled an estimated 112,000 vehicles, a 9.9% increase over the four-year average. Based on this registration figure, the 1989 collision rate was 566.5 collisions per 10,000 registered trucks, a decrease of 20.8% from the four-year average.

There were 79 heavy trucks involved in fatal collisions during 1989, the same as recorded in 1988. This was a 5.0% increase compared to the baseline average. The fatal collision rate was down slightly from the previous year, and down 4.8% from the previous four-year average rate of 7.4 deaths per 10,000 registered trucks.

The estimated registration of heavy trucks has been adjusted for 1989 and the previous years based on updated information on the light/heavy truck registration mix obtained from the Washington Department of Transportation (Table 8-1).

Table 8-1

SUMMARY OF HEAVY TRUCKS
Heavy Trucks Involved in Traffic Collisions

Collision Severity/Exposure & Rates	Year 1989	1988	1987	1986	1985	Previous 4-Year Average	% of Change 89 - 4-Year Average
Total Trucks Involved in Collisions	6,345	6,149	6,243	7,983	8,605	7,245	-12.42%
Trucks Involved in Fatal Collisions	79	79	71	66	85	75	4.98%
Registration of Heavy Trucks*	112,000	106,400	104,200	101,368	95,800	101,942	9.87%
Total Collision Rate**	566.5	577.9	599.1	787.5	898.2	715.7	-20.84%
Fatal Collision Rate**	7.1	7.4	6.8	6.5	8.9	7.4	-4.75%

Source: WSP

* Estimated
**Collisions per 10,000 registered trucks

A. Age of Drivers Involved in Heavy Truck Collisions

The 39-year-old and younger drivers were over-represented in heavy truck collisions compared to the percentage of licensed drivers each group composed. The 19 and under group composed only 0.2% of all licensed heavy truck operators, yet this group was involved in 1.6% of all heavy truck collisions and 2.3% of the heavy truck injury collisions. The ratio for percent of collision involvement compared to percent of licensed drivers composed by the 19 and under age group resulted in an over-representation ratio of 8.35 for this group.

The 20-29 year old age group was involved in 24.1% of the total collisions, 17.3% of the fatal collision and 25.0% of the injury collisions. This group composed 13.1% of all drivers having a classified endorsement on their licenses. Based on the percentage of licensed drivers and collision involvement, this group was over-represented in collisions by a ratio of 1.84.

The 30-39 year-old age group was involved in 32.5% of the total reported collisions and made up 26.7% of the drivers having a classified endorsement on their license. The representation for this group was nearly equal. The rest of the driver age groups were under-represented in total collisions compared to the number of licensed drivers (Table 8-2).

Table 8-2

Source: WSP, DOL

DRIVERS INVOLVED IN HEAVY TRUCK COLLISIONS
By Age

Age	All Collisions		Fatal Collisions		Injury Collisions		% of Classified Drivers*	Over/Under Ratio**
	Number	%	Number	%	Number	%		
19 & Under	91	1.6%	0	0.0%	43	2.3%	0.2%	8.35
20-29	1,386	24.1%	13	17.3%	458	25.0%	13.1%	1.84
30-39	1,875	32.5%	20	26.7%	598	32.6%	29.2%	1.11
40-49	1,359	23.6%	16	21.3%	426	23.3%	27.2%	0.87
50-59	790	13.7%	19	25.3%	233	12.7%	17.0%	0.80
60 & Over	260	4.5%	7	9.3%	74	4.0%	13.2%	0.34

* Classified Endorsement is required only for operators of the larger trucks and truck combinations
** Percent of collision involvement to percent of licensed drivers

B. Heavy Truck Defects

Defective brakes accounted for 36.7% of the defects detected in heavy trucks involved in collisions in 1989. Other defects included 10.2% worn or smooth tires, 4.8% defective rear lights, 3.2% defective steering, and 41.5% other defects (Table 8-3).

Table 8-3

Source: WSP

DEFECTS OF HEAVY TRUCKS INVOLVED IN COLLISIONS
Four-Year Comparison

Condition of Vehicle	1989		1988		1987		1986	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Defective Brakes	206	36.7%	236	40.4%	254	39.6%	329	42.1%
Defective Headlights	6	1.1%	6	1.0%	6	0.9%	4	0.5%
Defective Rear Lights	27	4.8%	37	6.3%	27	4.2%	48	6.1%
Defective Steering Mechanism	18	3.2%	32	5.5%	30	4.7%	33	4.2%
Puncture or Blowout	14	2.5%	24	4.1%	23	3.6%	21	2.7%
Worn or Smooth Tires	57	10.2%	74	12.7%	79	12.3%	87	11.1%
Other Defects	233	41.5%	175	30.0%	222	34.6%	259	33.2%

C. Location of Heavy Truck Collisions By Severity

In 1989, 54.8% of the collisions involving heavy trucks occurred in urban areas (Figure 8-1). There were 22 heavy trucks involved in fatal collisions in urban areas, compared to 57 in the rural areas. These figures compose a 27.8% to 72.2% urban/rural proportion of involvement in fatal collisions (Figure 8-2). The 1989 heavy truck involvement in injury collisions was split, 994 urban to 1,035 rural. These figures represent a 49.0% to 51.0% urban/rural split (Figure 8-3).

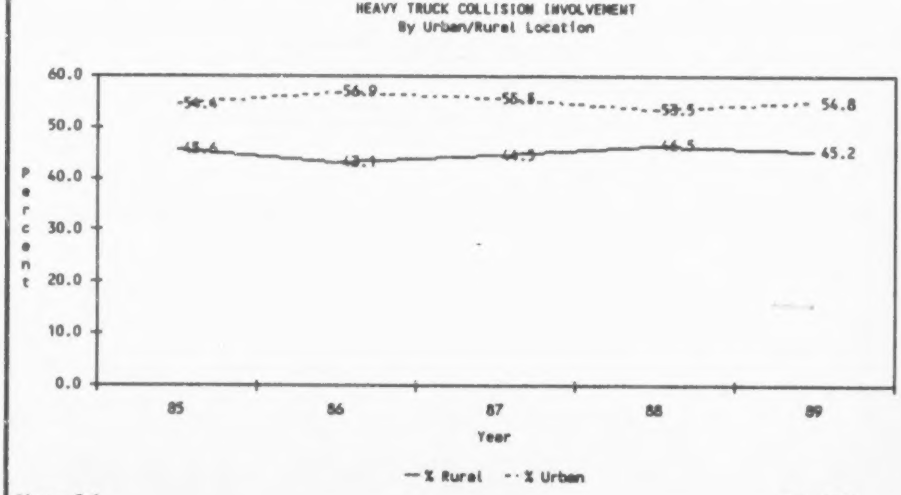


Figure 8-1

Source: WSP

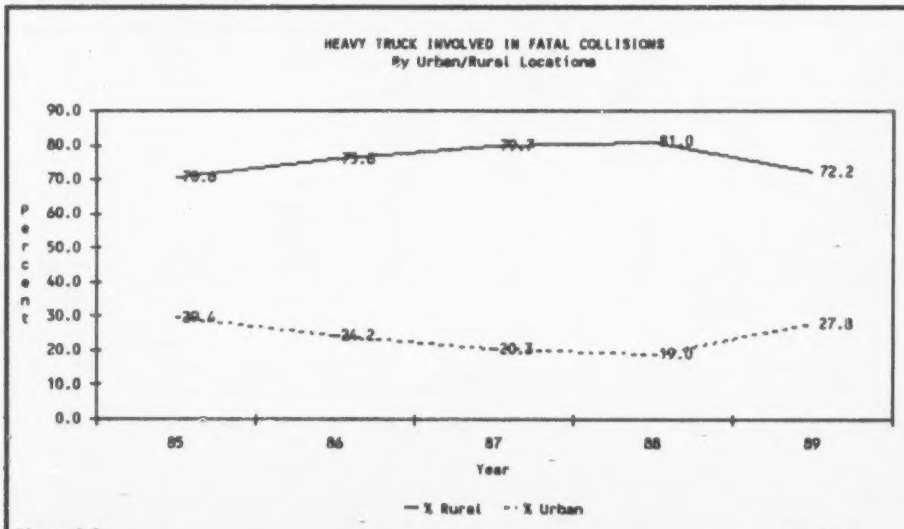


Figure 8-2

Source: WSP

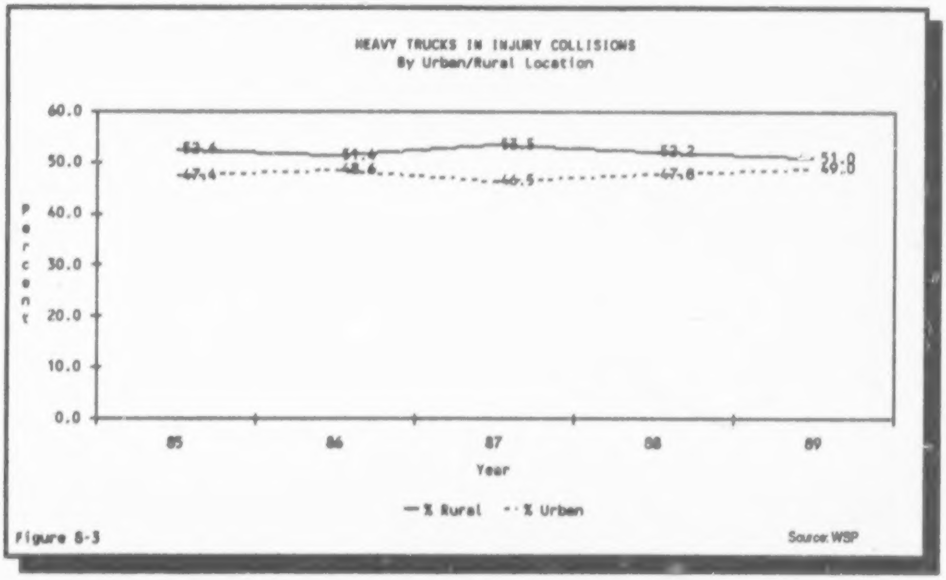


Figure 8-3

Source: WSP

D. Heavy Truck Collision Occurrences By Time

The weekdays showed the highest frequency of heavy truck collision involvement, and Friday recorded the single day high. During the weekend, as expected, there was a substantial decline in the frequency of heavy truck involvement in collisions (Figure 8-4).

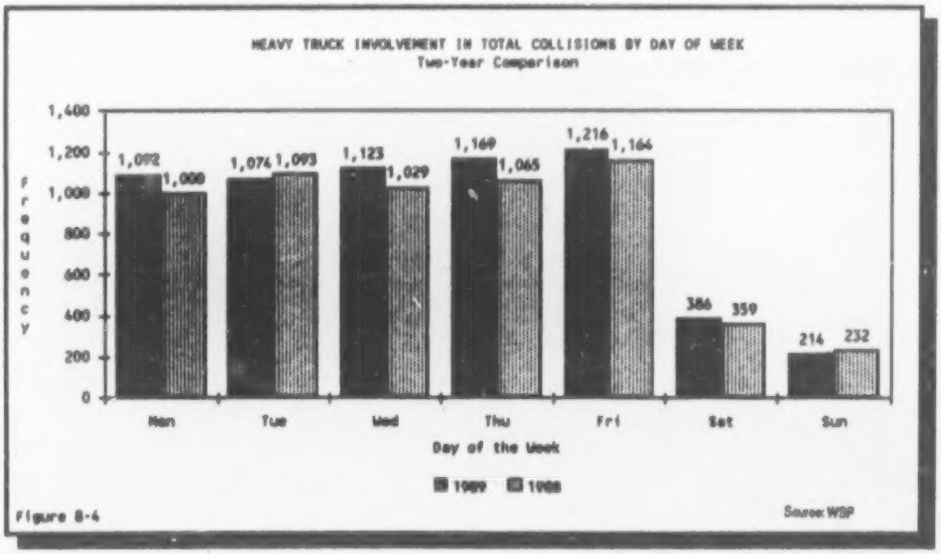


Figure 8-4

Source: WSP

Last year, the time period from noon to 3 p.m. recorded the highest incidence of heavy truck involvement in collisions. A substantial increase in collisions began during the 6 a.m. to 9 a.m. time period, peaked at the noon to 3 p.m. period, remained high during the 3 p.m. to 6 p.m. period, and then sharply declined (Figure 8-5).

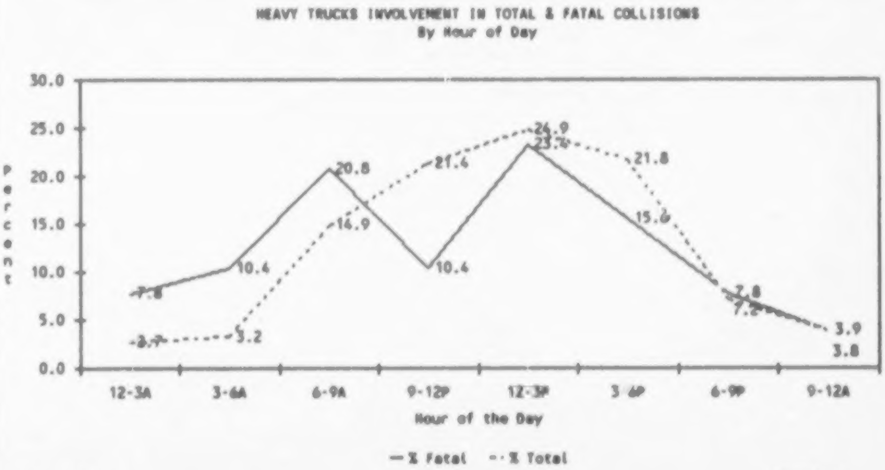


Figure 8-5

Source WSP

E. Total Collisions - Light Trucks vs. Heavy Trucks

There were 60,842 light trucks and 6,345 heavy trucks involved in collisions in 1989, a 90.6% and 9.4% ratio. This ratio has been shifting toward light trucks every year since 1985 (Figure 8-6).

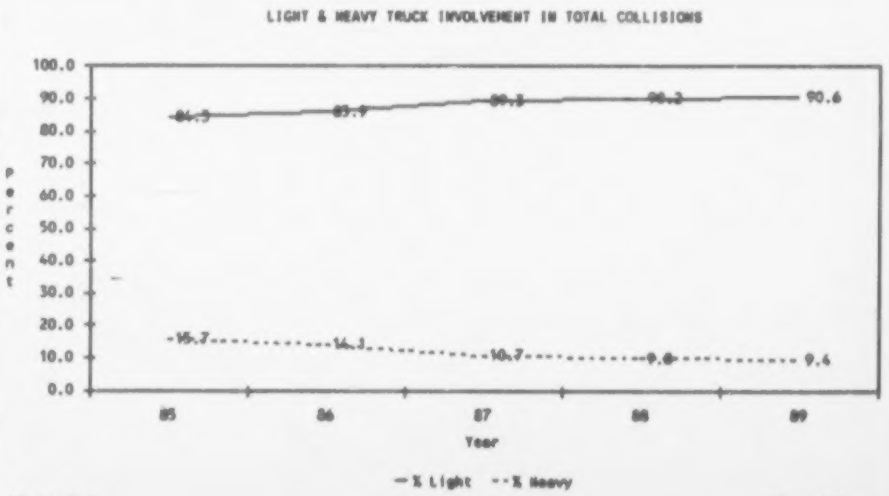


Figure 8-6

Source WSP

F. Collisions By First Harmful Event

Heavy trucks were involved in 4,728 collisions involving other moving motor vehicles. This figure represents 74.2% of all heavy truck collisions for 1989. Heavy trucks also were involved in 412 collisions in which the other vehicle was parked and in 667 collisions with fixed or other objects. Overturning, other non-collisions, and all other collisions accounted for the remaining heavy-truck involved collisions (Table 8-4).

Table 8-4

HEAVY TRUCK COLLISIONS BY FIRST HARMFUL EVENT
Four-Year Comparison

Type of Collision	1989		1988		1987		1986	
	Number	% of Total	Number	% of Total	Number	% of Total	Number	% of Total
Collision with other moving motor vehicles	4,728	74.2%	4,388	73.8%	4,595	73.6%	5,686	73.7%
Collision with parked vehicle	412	6.5%	353	5.9%	440	7.0%	600	7.8%
Collision with fixed/other object	667	10.5%	677	11.4%	636	10.2%	792	10.3%
Overturning	379	5.9%	349	5.9%	379	6.1%	386	5.0%
Other non-collision	113	1.8%	105	1.8%	107	1.7%	116	1.5%
All other collisions*	75	1.2%	70	1.2%	86	1.4%	130	1.7%

* Pedestrians, pedalcyclists, RR train & animal.

Source: WSP

IX. Pupil Transportation

During the 1988-89 school year, there were 371 reported school bus collisions in which 216 persons were injured and 1 driver, the driver of the "other" vehicle, was killed. This represented a 16.6% increase over the previous three-year average in total school bus collisions, a 11.0% increase in the number of persons injured, and a decrease of 1 in the number killed. Injuries to pupils riding in the school buses totaled 66 for the 1988-89 school year; down from the 116 reported for the 1987/88 school year and from the three-year average of 68 pupils injured.

There were no fatals, but 3 major, 19 minor, and 71 possible injuries of school bus occupants during the 1988-89 school year. This was up 1 in the major injury category, but down in the other injury severities from the three-year average.

There were 6,627 registered school buses in the 1988-89 school year. This marked a 6.1% increase in registrations from the baseline period. School bus travel increased 6.41% during the 1988-89 school year compared to the previous three-year baseline period (Table 9-1).

Table 9-1

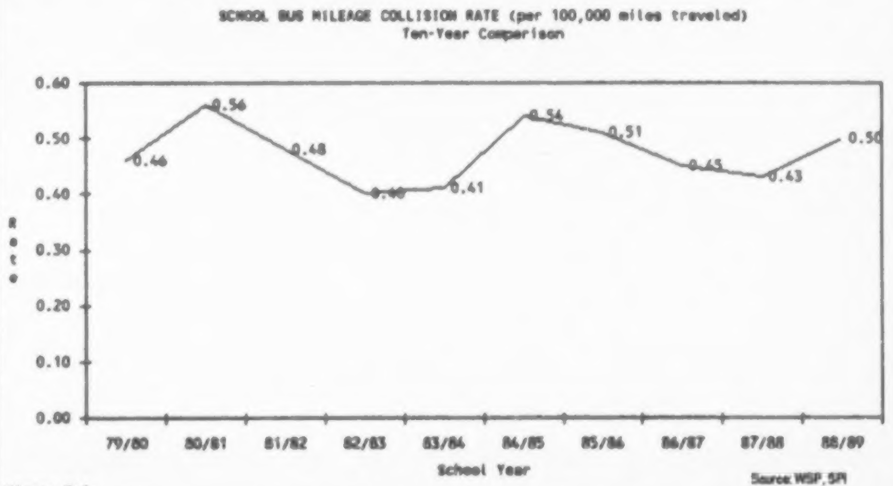
COLLISIONS INVOLVING SCHOOL BUSES
Four-Year Comparison

Severity, Exposure & Rates	Years				Previous 3-Year Average	% of Change 89 - 3-Year Average
	88-89	87-88	86-87	85-86		
Total Collisions	371	311	310	338	320	16.06%
Fatal Collisions	1	1	5	0	2	-50.00%
Injury Collisions	121	115	92	95	101	20.20%
Property Damage Collisions	249	195	213	243	217	14.75%
Number Killed	1	1	5	0	2	-50.00%
Persons Injured						
Pupils	66	116	59	29	68	-2.94%
School Bus Drivers	21	28	9	19	19	12.50%
Other Occupants of School Bus	1	0	1	2	1	0.00%
Pedestrian/Bicyclist	5	7	7	5	6	-21.05%
Occupants/Other Vehicles Involved	123	117	93	92	101	22.19%
Total Injured	216	268	169	147	195	10.96%
Severity of School Bus Occupant Injury						
Major Injury	3	4	1	0	2	80.00%
Minor Injury	19	75	9	24	36	-47.22%
Possible Injury	71	69	59	27	52	37.42%
School Bus Registration	6,627	6,427	6,185	6,121	6,244	6.13%
Registration Collision Rate*	56.0	48.6	50.1	55.2	51.2	9.25%
Miles Traveled (in thousands)	73,799.7	72,816.2	68,658.8	66,586.6	69,353.9	6.41%
Mileage Collision Rate**	0.50	0.43	0.45	0.51	0.462	8.79%

* Collisions per 1,000 registered vehicles
** Collisions per 100,000 miles traveled

Source: WSP, SPI

During the 1988-89 school year, the school bus mileage collision rate was .50 collisions per 100,000 miles of travel. This rate was up from the 0.43 rate experienced in the 1987-88 school year and the previous three-year baseline (Figure 9-1).

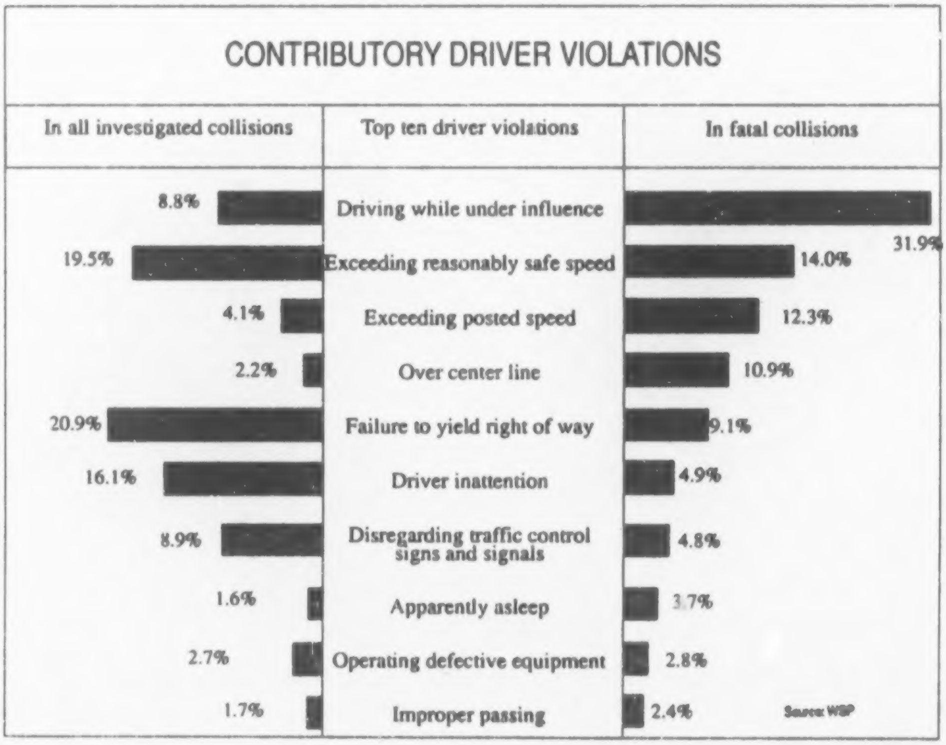


Source: WSP, SPI

Figure 9-1

X. Contributory Driver Violations

Driving while under the influence of intoxicating liquor/drugs contributed to 31.9% of the driver violations in fatal collisions and 8.8% of all investigated collisions. Failure to yield right of way contributed to 20.9% of all investigated collisions and 9.1% of the violations in fatal collisions. Exceeding reasonable safe speed contributed to 19.57% of all investigated collisions and 14.0% of the fatal collisions. Exceeding the posted speed was the 3rd ranking driver violation in fatal collisions. It contributed to 4.1% of all investigated collisions. (Figure 10-1).



Source: WSP

XI. Senior Driver Involvement

Last year 26,873 senior drivers, 55 years old and older, were involved in 24,896 reported collisions in 1989. There were 158 fatal collisions involving 174 senior drivers and 9,786 injury collisions involving 10,559 senior drivers. This was a 3.5% increase of seniors involved in reported collisions, a 18.2% increase of the number involved in fatal crashes, and a 9.3% increase of those involved in injury collisions compared to the previous four-year baseline period. The number of drivers licenses issued to senior drivers also increased 6.5% from the baseline average to 780,607. The total collision rate (total collisions per 1,000 licensed drivers) of 3.44 for 1989 was down 2.9% from the baseline period (Table 11-1).

Table 11-1

SENIOR DRIVERS (55 YEARS & OLDER) INVOLVED IN COLLISIONS+
Five-Year Comparison

Collisions & Rates	Year					Previous 4-Year Average	% of Change 89 - 4-Year Average
	1989	1988	1987	1986	1985		
Senior drivers involved in							
Total Collisions	26,873	26,584	26,482	25,842	24,978	25,972	3.5%
Fatal Collisions	174	148	157	140	144	147	18.2%
Injury Collisions	10,559	10,197	9,634	9,560	9,264	9,664	9.3%
Licensed Drivers	780,607	763,079	741,653	719,784	706,719	732,809	6.5%
Fatal Collision Ratio*	6.47	5.57	5.93	5.42	5.77	5.67	14.2%
Fatal Rate**	0.22	0.19	0.21	0.19	0.20	0.20	11.5%
Total Collision Rate***	3.44	3.48	3.57	3.59	3.53	3.54	-2.9%

Source: WSP, DOL

+ The number of senior drivers involved
* Fatal Collisions per 1,000 total collisions
** Fatal Collisions per 1,000 licensed drivers
*** Senior drivers involved per 100 licensed

A. Senior Driver Collisions By First Harmful Event

In 1989, 87.3% of the collisions involving senior drivers were "collisions with other moving vehicles." This type of collision also resulted in the greatest percentage of fatal collisions (67.1%) and injury collisions (85.5%). Single-vehicle collisions with fixed objects led to the second largest percentage of senior drivers involvement in total, fatal and injury collisions at 6.1%, 13.3% and 6.7% respectively. While collisions with pedestrians and bicycles comprised only 1.8% of the total senior driver collisions, 15.3% of the fatal crashes and 4.3% of the seniors' injury collisions were collisions with pedestrians and bicycles (Table 11-2).

Table 11-2

Source: WSP

COLLISIONS INVOLVING SENIOR DRIVERS*
By First Harmful Event

Type of Collision	Total Collisions		Fatal Collisions		Injury Collisions	
	Number	% of Total	Number	% of Total	Number	% of Total
Collision with other moving motor vehicles	21,732	87.3%	106	67.1%	8,365	85.5%
Collision with parked vehicle	545	2.2%	3	1.9%	103	1.1%
Collision with fixed/other object	1,515	6.1%	21	13.3%	651	6.7%
Overturning & other non collision	413	1.7%	7	4.4%	216	2.2%
Collisions with pedestrian & bicycles	445	1.8%	19	12.0%	423	4.3%
Other collisions including RR train, animal	246	1.0%	2	1.3%	28	0.3%
TOTAL	24,896	100.0%	158	100.0%	9,786	100.0%

* Collisions in which one or more senior drivers involved

B. Senior Driver Collision Involvement By Age Group

Failure to yield right-of-way contributed to 47.1% of the total drivers violations for drivers 75 years and older. This violation was also the leading violation for all drivers 55 years and older. This was followed by disregarding traffic control signs and signals for drivers 75 and over. Speed too fast for conditions was the second leading contributing cause for drivers 55 through 74 years of age (Table 11-3).

Table 11-3

55 YEAR & OLDER INVOLVEMENT IN TOTAL COLLISIONS
Percent of Total Circumstances by Age Group

Contributing Circumstances*	55-59		60-64		65-69		70-74		75 & Older	
	Number	%	Number	%	Number	%	Number	%	Number	%
Failure to Yield Right of Way	833	29.3%	778	31.4%	951	40.3%	866	43.0%	1,441	47.1%
Speed--Too Fast For Conditions	458	16.1%	366	14.8%	259	11.0%	195	9.7%	217	7.1%
Disregarding Traffic Signal/Signs	217	7.6%	216	8.7%	208	8.8%	187	9.3%	354	11.6%
Following Too Closely	274	9.6%	223	9.0%	203	8.6%	137	6.8%	183	6.0%
Driving While Under the Influence	210	7.4%	140	5.7%	95	4.0%	61	3.0%	46	1.5%
Operating Defective Equipment	52	1.8%	42	1.7%	38	1.6%	29	1.4%	36	1.2%
Crossing Over the Centerline	55	1.9%	47	1.9%	40	1.7%	32	1.6%	42	1.4%
Exceeding Legal Speed	36	1.3%	18	0.7%	18	0.8%	15	0.7%	13	0.4%
All Other Circumstances including Driver Inattention	711	25.0%	647	26.1%	546	23.2%	491	24.4%	728	23.8%
TOTAL	2,846	100.0%	2,477	100.0%	2,358	100.0%	2,013	100.0%	3,060	100.0%

*Investigated collisions only

Source: WSP

In 1989, the 55-59 year old group was involved in 6,971 reported collisions for 3.53% of all collisions. This group made up 5.35% of the total number of drivers licensed to drive in this state. The under-representation ratio of 0.66 is nearly the same as the 0.64 ratio reported for the previous year and for the previous four-year baseline average (Figure 11-1).

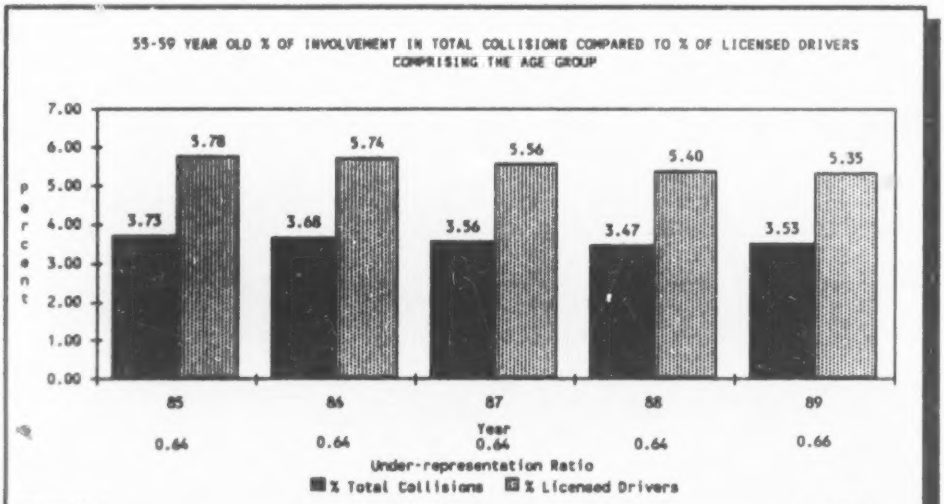


Figure 11-1

Source: WSP, DOL

The 60-64 age group posted an under-representation ratio of 0.58, which was the same as the previous year but up slightly from the previous four-year baseline average (Figure 11-2).

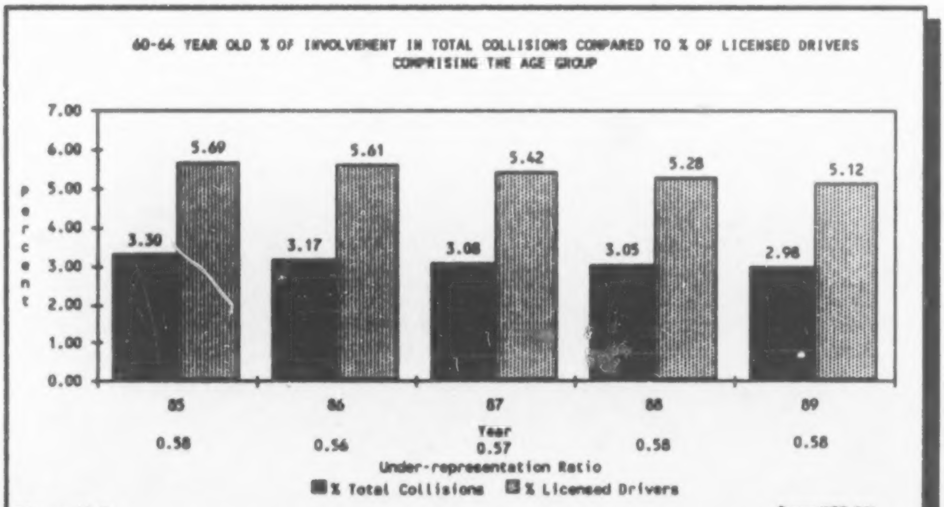


Figure 11-2

Source: WSP, DOL

The 65-69 year old group recorded a 0.54 under-representation ratio, a slightly higher representation than in the previous year and in the baseline period (Figure 11-3).

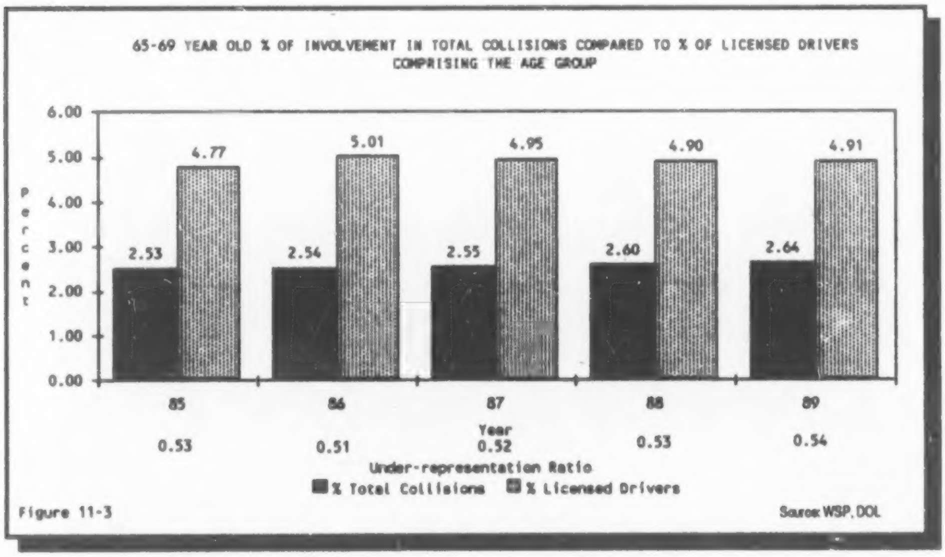


Figure 11-3

Source: WSP, DOL

The 70-74 age group recorded a 0.54 under-representation ratio, the same as the baseline average (Figure 11-4).

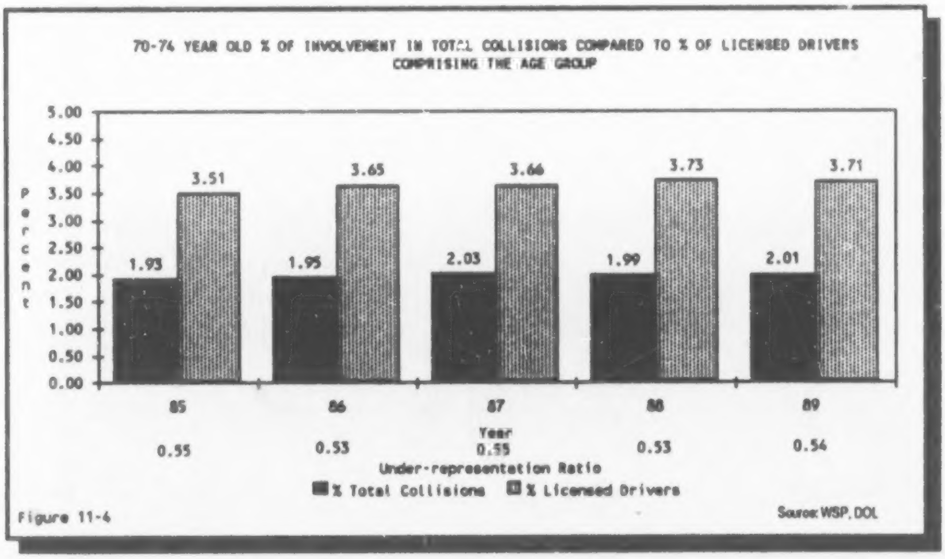


Figure 11-4

Source: WSP, DOL

The last group is the 75 years and older group. This group had a .58 under-representation, down from the baseline ratio of .61 (Figure 11-5).

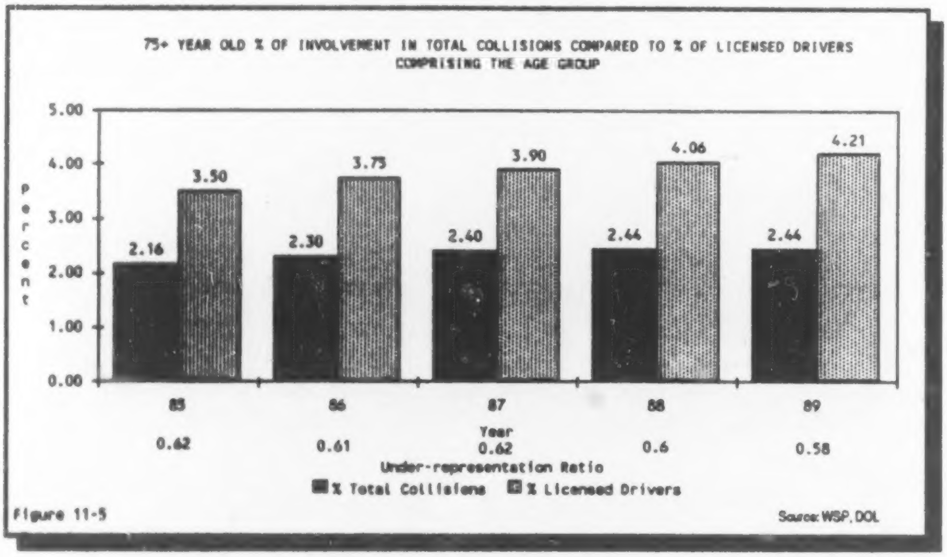


Figure 11-5

Source: WSP, DOL

The urban/rural collision ratio involving senior drivers (55 years old and older) remained relatively constant during the past eight years with a 63.2 to 36.8 urban/rural mix for 1989 (Figure 11-6).

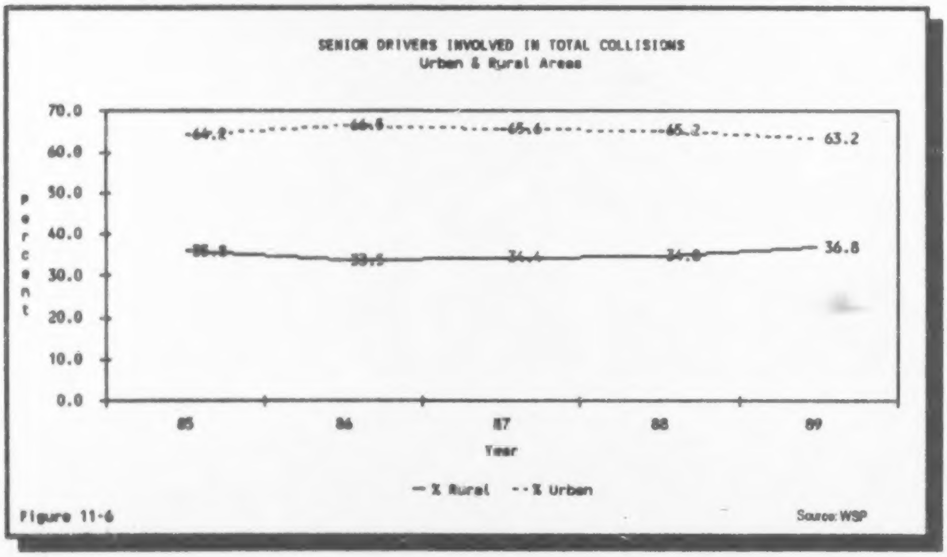


Figure 11-6

Source: WSP

The senior driver injury collision urban/rural mix has also remained fairly constant during the past eight years with 60.3% occurring in the urban areas (Figure 11-7).

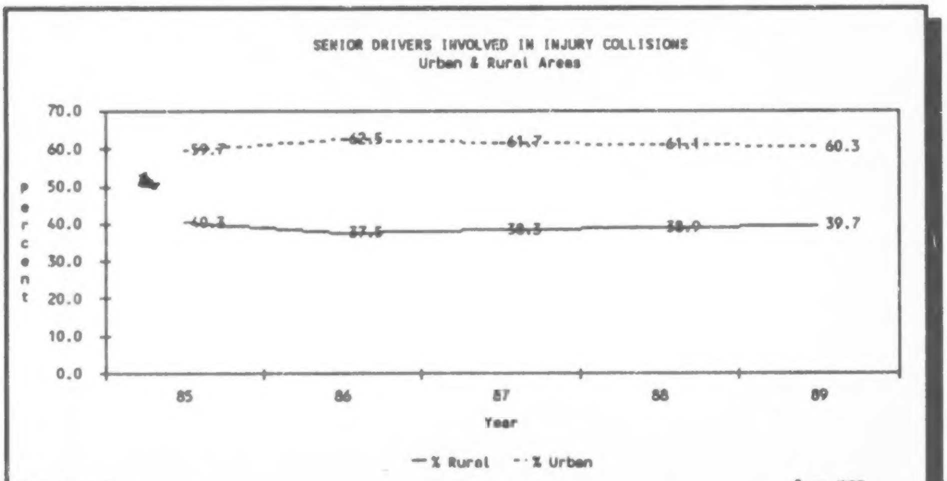


Figure 11-7

Source: WSP

Senior driver fatal collisions continued to be more common in rural areas; the percentage increased to 75.9% in 1989. Three quarters of all fatal collisions involving senior drivers occurred in rural areas (Figure 11-8).

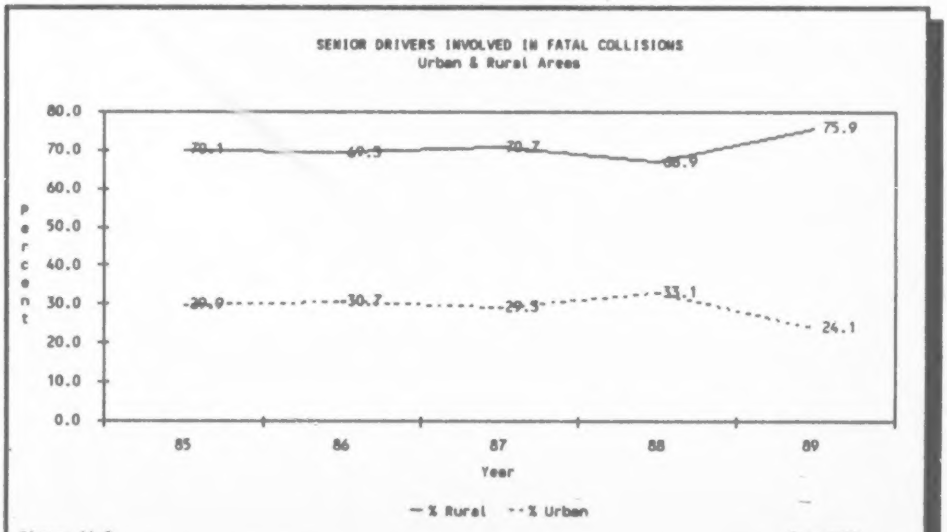


Figure 11-8

Source: WSP

C. Senior Driver Involvement By Time

Last year, 21.2% of all rural fatal collisions involving senior drivers occurred on Friday, 17.8% occurred on Saturday, and 16.1% occurred on Tuesday. Friday was also the high day of the week for total reported rural collisions, accounting for 17.7% of the senior driver collisions. Thursday followed with 15.6% and Wednesday was next with 15.5% of the collisions (Figure 11-9).

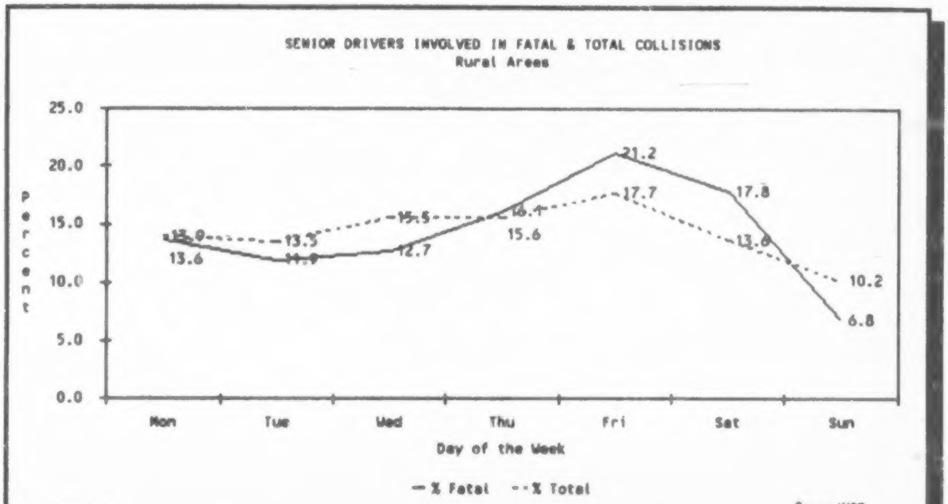


Figure 11-9

Source: WSP

Wednesday was the highest fatal collision day, recording 27.5%, followed by Friday with 17.5% of the senior-drivers urban-area fatal collisions. Friday recorded the greatest percentage of urban total reported collisions, 18.6%, for the group (Figure 11-10).

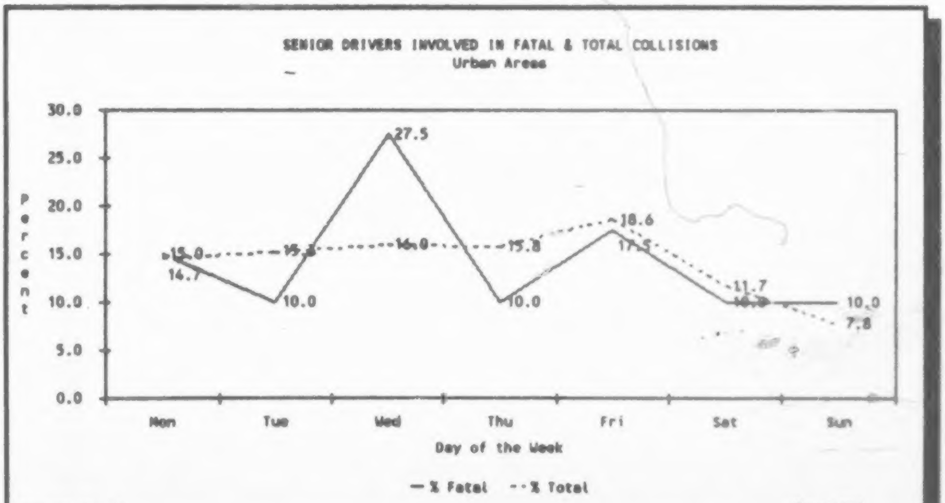


Figure 11-10

Source: WSP

In rural areas, the greatest percentage (24.6%) of senior driver involvement in fatal crashes occurred from 12 noon to 3 p.m.. The greatest percentage of total collision involvement (29.6%) for these drivers also occurred from 3 p.m. to 6 p.m. (Figure 11-11).

In the urban areas, the greatest senior involvement in fatal collisions, 30%, was from 3 p.m. to 6 p.m. This same time period recorded 27.5% of the total urban reported collisions of the senior drivers (Figure 11-12).

SENIOR DRIVERS INVOLVED IN FATAL & TOTAL COLLISIONS BY HOUR OF DAY
Urban Areas

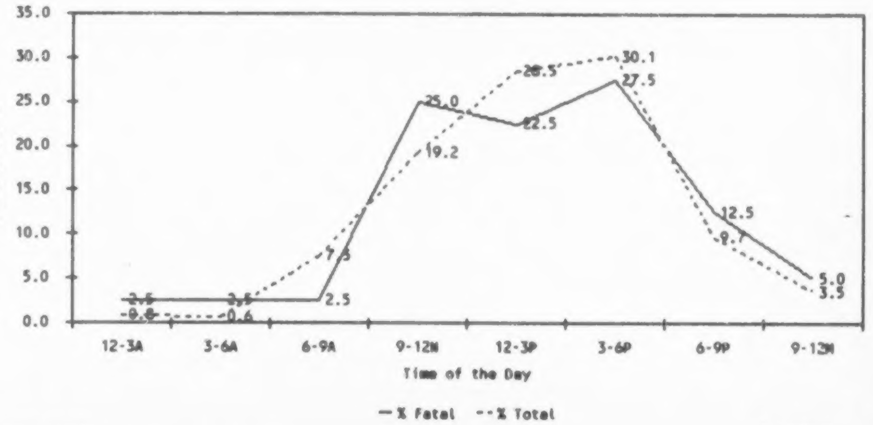


Figure 11-12

Source: WSP

SENIOR DRIVERS INVOLVED IN FATAL & TOTAL COLLISIONS BY HOUR OF DAY
Rural Areas

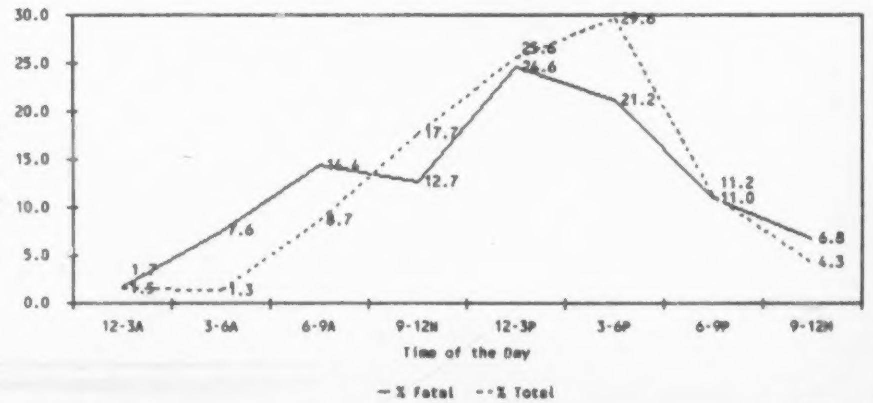


Figure 11-11

Source: WSP

XII. Vehicle Defects

In investigated collisions during 1989, only 4.2% of the collision-involved vehicles were found to have contributory vehicle defects. The most common defect was worn or smooth tires, a defect found in 2,165 vehicles. This represented a 25.1% decrease in this category compared to the previous four-year average. Defective brakes, the second most contributory defect, was found on 1,671 collision-involved vehicles in 1989. This was an increase of 11.1% compared to the baseline (Table 12-1).

Table 12-1

VEHICLE CONDITION*
Five-Year Comparison

Description	Year					Previous 4-Year Average	% of Change 89 - 4-Year Average
	1989	1988	1987	1986	1985		
Defective Tires:							
Worn or Smooth Tires	2,165	2,577	2,806	3,129	3,043	2,889	-25.1%
Puncture or Blowout	405	442	469	343	345	400	1.3%
Defective Brakes	1,671	1,859	1,961	2,026	1,723	1,892	-11.7%
Defective Lights:							
Headlights	164	156	144	167	156	156	5.3%
Rear Lights	387	423	331	373	370	374	3.4%
Other Lights/Reflectors	114	106	116	112	97	108	5.8%
Defective Steering	279	306	339	287	* 307	310	-9.9%
All Other Defects	1,971	1,683	2,082	2,026	1,963	1,939	1.7%
No Defects	161,829	164,102	161,595	156,360	147,591	157,412	2.8%
TOTAL VEHICLES INVOLVED	168,985	171,654	169,843	164,823	155,595	165,479	2.1%

Source: WSP

* Investigated Collisions